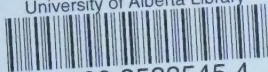


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Meaning of Form and the Unit of Expression
.....
in the Graphic Representation of Concepts
.....
submitted by Norman J Schmidt
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Some Considerations of
the Meaning of Form and
the Unit of Expression
in the Graphic
Representation
of Concepts

NORMAN J SCHMIDT



Some Considerations of the Meaning of Form and the Unit of Expression in the Graphic Representation of Concepts

Presented to the University of Alberta Faculty of Graduate Studies and Research
Department of Art and Design in Partial Fulfilment of the Requirements for the
Degree of Master of Visual Arts in Visual Communication Design.

NORMAN J SCHMIDT

1987



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PART 1 *Overview*

The Graphic Representation of Concepts

One of the most important aspects of the graphic representation of concepts is the way in which the concepts are represented. This is because the way in which concepts are represented can have a significant impact on the way in which they are understood and used.

There are many different ways in which concepts can be represented. Some of the most common ways are by using words, symbols, or pictures. Each of these ways has its own strengths and weaknesses. For example, words are easy to understand and use, but they can be ambiguous. Symbols are easy to use and understand, but they can be difficult to explain. Pictures are easy to understand and use, but they can be difficult to explain.

One of the most important things to remember when representing concepts is to be clear and concise. This means using words, symbols, or pictures that are easy to understand and use. It also means using a consistent system of representation. For example, if you are using symbols to represent concepts, you should use the same symbol for the same concept every time. This will help people to understand and use your system of representation more easily.

Another important thing to remember when representing concepts is to be accurate. This means using words, symbols, or pictures that correctly represent the concepts they are intended to represent. For example, if you are using a picture to represent a concept, you should make sure that the picture is a good representation of the concept. This will help people to understand and use your system of representation more easily.

1 Introduction

The personal computer is challenging individuals' communication skills because of the way in which various functions are integrated in its operation and the ease with which it can be used.

Computers were first put to use by big corporations for large-scale efficiency-oriented tasks. The miniaturization of electronic components and the ever increasing speed of binary switching through the use of silicon semi-conductors set the stage for an entirely different approach to computer application. It led to the making of microprocessors.

Microprocessors were first made by the large electronics corporations as an adjunct to large processors. They were first considered as mere smaller versions of the mainframes operating on the assumption that the users were also programmers or at least were proficient in computer coding. They were only secondarily conceived of as a personal tool. But because "communicating" with the processor (by way of instructions) is endemic to computing, as the microprocessors were used for a growing variety of tasks, various innovative individuals sought ways of improving the way in which the user accessed the processor. This affected the ways in which it was integrated as a tool into the various tasks at hand. Their quest had far-reaching effects and their efforts represented a challenge to tradition right from the start, first in computing and then in the tasks that became "computerized."

The advent of this personal computer, functioning on a principle of a kind of cryptic "dialogue" between the microprocessor and the user in which the actual coding remains hidden, has resulted in an interactive operation. This has provided a different way in which the mind, the eye, and the hand can co-operate in the process of making things. It presents a challenge to creativity and expression. The personal computer is a highly complex tool capable of integrating a number of different operations. Of particular importance to this study is the making of words and pictures for the purposes of communication. The personal computer, while it could be used to display information solely on the CRT, can also be used as a creative tool for the making of printed communication because of the way in which information can be output on print-oriented devices. The question which has arisen concerning the demise of print in light of electronic display will not be addressed. What is of importance is the

fact that the personal computer is presenting a major challenge to the way in which we can approach the graphic representation of concepts. It presents a major departure from the traditional relationships between the activities of writing text, picture making, typography and print production. With the personal computer it is easy to combine words and pictures because of the way in which different software programs are made to interact and the way in which all information is reduced to the same basic pixel.● The screen pixel does not necessarily coincide with the pixel of the output device because of the varying resolutions possible in different devices. In output devices having a high resolution the screen image can only approximate the image of the output.

The ease of use of the personal computer ensures that many individuals will actually be using it on a regular basis. But for someone who has had an ordinary education and is skilled primarily in communicating with words this integration of pictures and words is not a normal activity and does not necessarily come easily. Ordinarily the complex processes and careful decisions made by designers of printed matter in selecting combinations of words and pictures are not thought about by the average literate individual. Where a young child who already has some command of writing will quite naturally combine words and pictures, for a literate adult this requires a special effort.

To create an expressive and harmonious whole, textual and graphic elements are integrated through conscious processes of selecting, sizing, arranging, and combining, and depend on a variety of technical operations to be realized in printed form. The personal computer provides the means for integrating these processes within the operations of a single tool and its peripheral devices. Therefore also for professional graphic designers who are accustomed to thinking in terms of word/picture concepts there are new challenges to how they might be combined.

The best printed matter is that in which visual form has been conceived of as an integral part of interpreting the concepts being presented. Form is related to the deep and permanent structure of language, and although it depends on such things as spatial organization, scale, and typographic makeup, it ultimately depends on appeal to the readers' greater sensibilities and understanding. It creates an atmosphere and attains its own personality and has a visual excitement that is in keeping with the purposes of the

document. Successful design helps concepts come alive, makes them interesting, and makes them memorable for the reader. The personal computer makes it easy to control the organization of all the various elements, what it does not do is automatically create appealing form, this must be provided by the creative efforts of the user. But because the one tool now combines so many operations with ease it encourages the combination of words and pictures. The creative potential of the personal computer challenges all literate individuals to a rethinking of the way in which words and pictures interact in the process of communication.

Three objectives may therefore be outlined:

- 1 To explore the graphic representation of concepts from a traditional approach versus an approach that explores the potentials of new technology using rhetoric as a means of integrating word-concepts and picture-concepts for the purposes of appealing to the readers' sensibilities and understanding. Rhetoric has sometimes been seen as a means of sharpening persuasion to the point of becoming a coercive force in propaganda. While much has been said about techniques of persuasion in publicity and their role in a technological society and their effects on people, that debate will be left on the side. While different images and different words do of course affect different people differently, some consideration must, however, be given to the relative importance of selecting one over the other. What is important is that rhetoric provides a means of organizing concepts and is therefore a means to creativity and expression.
- 2 To explore the image-making capabilities of the new technology. Traditionally hand-making and machine-making have both been applied to the creation of print. Every tool applied to material and every process of work yields particular results in the physical appearance of the thing made. The personal computer, through digitization, is presenting its own ways of making shapes and tonal values and provides different ways of combining them in the page.
- 3 To examine the impact of new technology on the placement of words and pictures in the spatial organization of the page. Different techniques of creating pages have resulted in different ways in

which words and pictures have traditionally been brought together in the organization of the page. New technology is allowing new ways in achieving page composition.

2 The Process of Form-Giving

(See Part 2, Sections 2.2 and 4.4)

2.1 Analysis

(See Part 2, Section 4.4.3)

Phase 1: Definition

The general topic is the wise use of the earth's resources and the International/Canadian Wildlife Federation and its goals concerning them. The task is the graphic visualization of the Federation, a non-profit organization dedicated to promoting the wise use of the earth's resources in all of its aspects on every continent. And to provide information and increase the awareness of some of the problems that exist in environmental and wildlife management, and specifically the effects of burning fossil fuels on the world's climate.

A C T

- We cannot control the supply of air and sun, but we influence the supply of soil, water, forests, minerals, and animals.
- The burning of fossil fuels: coal, oil & gas.
- Conservation: preserving, protecting, and promoting wise use of the earth's natural resources.

S C E N E

- Local and global.

Individuals and corporations in both industrial and non-industrial countries daily burn fossil fuels unthinkingly in daily living, nobody is exempt.

A G E N T

- Man the explorer, hunter, farmer, manufacturer, and tourist impacts on the environment of the earth.
- Individuals, corporations, governments:
Everyone desires and requires warmth and the cooking of food. We have various attitudes towards this fact. Industrialization (or the lack thereof) fosters and provides a particular quantity to individuals as normal amounts necessary for attaining these ends. Corporations and governments in industrial countries are the means for making the provisions and fostering the standards of consumption, based

upon economic ends. We know that forever increasing the amounts of fossil fuel use and the unchecked emission of exhaust is causing environmental problems. Yet the consumption is checked more by economic factors than by concern for the environment.

AGENCY

- Natural resources are not only limited but are easily damaged or destroyed by human activities: over cultivation, indiscriminate hunting/fishing, dumping industrial wastes into waterways and emitting them into the atmosphere, destructive visitation to wilderness areas.

- Combustion: fuels, fireplaces, stoves, furnaces.

Fuels: can be any substance that produces useful heat or power when burned. There are five kinds of fuel (1) solid (2) liquid (3) gaseous (4) chemical (5) atomic. They consist chiefly of carbon and hydrogen or compounds called hydrocarbons, as well as small amounts of nitrogen, oxygen, sulphur and ash. When common fuels burn the carbon and hydrogen react with oxygen and form new products. A chief substance is carbon dioxide.

- Heat Values: Before industrialization wood was the chief fuel. Since industrialization other fuels with greater heat values have been sought.

Wood 6000-7000 BTU/pound

Coal 9000-15000

Fuel Oils 18000-20000

Kerosene 20000

Gasoline 21500

Natural Gas (chiefly methane) 1200 BTU/cu ft

Acetylene 1500

Propane 2500

Butane 3000

Manufactured gases (from coal or oil) 150-950

- Coal: Asia has most of the world's coal deposits, about one third lie in North America.

Mining:

USSR 600 million tons/year

Germany (E & W) 500

USA 500

China 300

Britain 200

"If the coal mined in the United States in a single year were used as paving material, it would build 12 superhighways 50 feet wide, 1 foot thick, and almost 3000 miles long, about the distance between San Francisco and New York City."

● **Increases:**

- world population has more than tripled since 1850 - to 5 billion
Although the industrialized part of the world is occupied by fewer than 1/4 of the world's people, it represents 3/4 of the world's energy consumption:

- coal (USA, but representative of all industrial countries)

1800 108,000 tons

1825 350,000

1850 8,000,000

1900 250,000,000

1925 600,000,000

1950 600,000,000

this is a 75 fold increase since 1850

- petroleum: most of the worlds petroleum lies in Asia, 12% lies in North America

Drilling in these regions: (by mult-national corporations)

USA 3,000,000,000 barrels/year

Middle East 2,600,000,000

USSR 2,000,000,000

Venezuela 1,500,000,000

- gas: reserves are usually found near petroleum deposits

North America taps 300 trillion cu ft / year

● **Climate and Its Source:**

- Radiation is an important factor in the world's climate. The sun gives off thermal radiation and visible radiation. Natural radiation makes life possible. It comes to us in an amazing way. Imagine a particle much too small to be seen by even the most powerful electron microscope. Imagine also that this tiny particle moves in a wavelike fashion and goes so fast that it would circle the earth more than seven times a second. This high-speed particle you have imagined is called the photon. Light rays, thermal radiation, radio waves, x-rays, cosmic rays, and the gamma rays used to split atoms are all streams of photons. Radiation is the term used to describe any stream of photons.

- As you read a page, photons emitted from the sun, or an electric light, are hitting the surface of the page. The black print absorbs

most of these tiny, vibrating "bullets" and their energy is converted into heat. The white parts of the page reflect most of the photons received. Some of these photons pass into and right through the pupils of your eyes, making sight possible. The lens of your eye focuses the photons so that they form on the light-sensitive retina of the eye the same pattern of light and dark that exists on the page. When you see colour your eyes are being hit by streams of photons which differ in their rates of vibration.

- But radiation is not always visible. When we go out in the sunlight, we may tan or sunburn. This condition results from the action of photons which have such a high frequency that they are invisible. These photons are ultraviolet rays. Other invisible photons, vibrating even more rapidly than ultraviolet rays, can pass through objects that visible light cannot penetrate. These are x-rays. Ultra-high frequency rays emitted as atoms split or decay are gamma rays. At the other end of the frequency scale are rays that vibrate too slowly to be seen. These are infrared rays. These photons provide radiant heat. Any warm object, like your body, gives off these rays. They are sometimes referred to as long waves. Rays of lower frequency still are the radio waves used in broadcasting. They are sometimes referred to as short waves. Between the highest and lowest frequency photons are all the sources of radiant energy.

- Weather and climate are the result of radiation from the sun.

Temperature affects the weather more more than any other single factor. Some of the radiation is reflected by the atmosphere, clouds and the surface of the earth, the rest is absorbed warming the earth. The atmosphere traps radiation much as a greenhouse does.

Because sunshine is radiation in the form of short waves (much of it in the visible spectrum), they easily pass through the density of the glass panes of the greenhouse. Plants and furniture in the greenhouse absorb some of the radiation and change it into heat. The plants and objects then radiate the heat in the form of long waves. These invisible long waves cannot pass easily through the density of the glass, so they remain in the greenhouse keeping it warm. The atmosphere surrounding the globe acts as do the panes of glass in a greenhouse. It lets in short waves but traps long waves giving the earth's air warmth.

- Heat Engine: The earth would become hotter and hotter if the atmosphere could not get rid of stored-up heat. Winds carry excess heat from the equator where solar radiation is most intense to the

polar regions which are cooler. The warm air at the equator weighs less than the cooler polar air and rises. Because of this, a permanent low-pressure area forms around the earth near the equator. This is the equatorial low. The cold air of the poles sinks to the earth, creating areas of polar high. The heavier air from the polar highs moves toward the equator. It pushes underneath the warm air, and forces it upwards into the upper atmosphere. The warm air, now held aloft by the cooler air beneath it moves toward the poles. This movement of air from the poles to the equator and back again is continuous.

- However, air masses do not move directly from the poles to the equator. The rotation of the earth causes the flow to the right of the direction in which they are moving in the Northern Hemisphere, and to the left in the Southern Hemisphere. These winds from the northeast in the Northern Hemisphere and from the southeast in the Southern Hemisphere are the trade winds. The air mass travelling in the upper atmosphere from the equator to the poles begins to sink near 30 degrees latitude. As the air drops, it spreads out. Some of it returns to the equator. The rest moves on toward the poles. This subtropical region has a belt of high pressure.

- The air that drops and continues on toward the poles begins to change direction. In the Northern Hemisphere, the rotation of the earth changes it from a south wind to a southwest or nearly west wind. The winds in this region are called the prevailing westerlies. Farther north, the polebound air masses meet the cold, heavy air of the polar region. The warm, light westerlies rise above the polar air. The boundary between the warm air mass and the cold air mass is called the polar front. The westerlies become quite strong about six or seven miles above the ground over the polar front. They form 300-mile wide bands of air called jet streams. They move from west to east, and their speed may reach 300 miles per hour. The main stream crosses North America at about 40 degrees latitude, but its path may vary greatly. The jet stream may bring storms and unsettled conditions to the regions on earth below it. The warm air that has travelled from the equator loses much of its heat in the polar regions, sinks and joins the cold polar air mass that pushes against fresh, warm air moving from the subtropics. This movement of air around the globe is the heat engine of the earth's climate.

- Also affecting the movement of air are the fact that land absorbs solar radiation faster than water, and the different positions of the

sun at different times of the year, and different terrain. Thus breezes from oceans and lakes modify weather in local regions. Warm ocean currents may flow toward the poles and bring warm winds with them to high latitudes. The sun shines directly above the equator only two days of the year. The position of the equatorial low and other pressure areas depend on the direction of the sun's rays striking the earth. Mountain ranges and other geographical features may alter the direction of prevailing winds and affect temperatures locally.

- Weather is therefore made up of (1) temperature (2) air pressure (3) wind (4) moisture
- Where two different air masses meet is a narrow band known as a front, where most weather changes take place.
- Climate is the usual weather in a certain area for a period of years. Therefore climate is the variety of weather conditions over this time period. It affects the kinds of plants that grow and animals that inhabit any given region of the earth. It affects the food supply for humans.

Cereals - Wheat thrives in areas that are neither very wet nor very dry, with warm to hot summers and cool to cold winters. Rice thrives in areas with warm rainy climates.

Fruits - Citrus fruits need mild climates, cool winters and warm to hot summers and plenty of moisture. Cold climates generally have few native fruit crops.

- Climate creates patterns of hot, cold, dry, and rainy regions throughout the world. Most of the warm regions are near the equator where solar radiation is most intense. The cold regions are near the poles. But the climate of any large area may vary greatly, even at the same latitude. The Andes Mountains cross the equator but have a polar climate. The Sahara, one of the world's hottest, driest places, lies 1800 miles north of the equator, but the Himalaya, which is about the same distance from the equator has a polar climate.

- There are nine kinds of climate found around the earth:
(1) rainy tropical (2) wet/dry tropical (3) semiarid (4) desert (5) warm rainy (6) warm rainy with dry summer (7) cold moist (8) polar (9) ice cap. They are affected by seven factors:

1) Latitude - affects climate in two ways (1) the height of the noon sun (2) the length of the day. They vary throughout the year depending on latitude.

2) Elevation - affects climate because the air in high areas is

generally cooler than in lowlands

3) Terrain - affects climate in three ways (1) some surfaces, like bare rock, sand and pavement, are strongly heated by solar radiation, others, like bodies of water, grassland and forests, are not (2) terrain influences wind by channelling it through valleys.

Mountains either block its flow or cause it to rise resulting in (3) rainfall, when warm moist air is forced to rise over mountain ranges into the cooler upper atmosphere.

4) Oceans - give coastal regions relatively cool air in the summer and relatively warm air in the winter. The west coasts of almost all continents in the middle latitudes have especially mild ocean climates because winds in these regions usually blow from west to east, bringing the mild ocean air inland. Oceans are also a source of rainfall. Air masses passing over them pick up moisture and bring clouds and precipitation. Coastal mountains that face ocean winds are very rainy. Much ocean air moves inland, often at great heights, yielding rain far inland.

5) Cold Continental Areas - in regions like Northern Asia and North America. When air masses leave these regions they bring cold waves with them, giving cold winters to neighbouring regions.

6) Hot Continental Areas - Dry, hot masses of air form in deserts and semiarid regions far from coasts. As air masses move away from these regions they some times bring heatwaves and cause droughts in neighbouring regions.

7) Storm Paths - In middle latitudes and near polar regions major storms move chiefly from west to east. These storm paths shift from season to season, and affect the amounts of rainfall in the areas they pass through.

● **Burning fossil fuels emit new substances into the atmosphere.** Sources of General Air Pollution:

Motor Vehicles 61%

Industry (including thermo-electric power plants) 29%

Heating 7%

Burning waste 3%

It does not take an environmental expert to notice the immediate effects of smoke on living things. But there are longer-range effects not noticed by the average person, a major one being the gradual warming of the earth's atmosphere because of the increasing amounts of carbon dioxide (CO₂) in the air due to the large amounts of fossil

fuels being burned around the world.

The International/Canadian Wildlife Federation has been established to make individuals, corporate leaders, and governments aware of problems concerning the environment and encourage the wise use of the earth's resources. It believes the only approach is an integration of forest, soil, water and wildlife management at all levels of civic, corporate and national levels worldwide.

● Some of its programs:

- the use of non-fossil fuels
- acid rain abatement program: Aim: immediate 30% reduction in sulphur dioxide emissions from fossil fuels (coal) = total of 8 million tons/year
- swamp and wetland management
- soil banks
- saving endangered species
- reforestation and tree farming
- fish farming
- wildlife refuges
- watershed protection
- shelterbelt planting
- bird population regeneration
- wildlife "harvesting"
- poaching control
- animal Rx
- pesticides: promise & peril

● Related fields with which it co-operates: soil sciences, climatology, forestry, civil engineering and landscape architecture.

● The Federation attempts to influence people through monitoring situations, through publications, and by sponsoring seminars that bring specialists together in discussion.

● ● ●

Text for publication: An Environment Report by Sam Iker. Recently a number of the world's leading climate experts gathered at Boulder, Colorado, to put together what may be the longest-range weather forecast ever attempted. Their prediction isn't simply an academic exercise, however. It is in response to a growing threat which many of them say is altering the global environment in a way unprecedented in human history. By burning fossil fuels – coal, oil,

and gas – man is gradually heating up the earth.

The experts are not sure exactly what the rate of warming is – or what the effects might be. But the impacts are potentially so sweeping that Gus Speth, former head of the President's Council on Environmental Quality (CEQ) in the United States, terms this problem "the ultimate environmental dilemma." The worst possible scenario is grim, indeed: by the middle of the next century, our planet could be warmer than at any time during the last 100,000 years. If that happened, entire growing zones, deserts, grasslands, and forests could all shift. Melting ice in the polar regions could raise sea levels 15 feet. The very pattern of life on our planet could be drastically altered. The cause of these potentially enormous changes in world climate involves an odorless, colourless gas called carbon dioxide (CO₂). A vital ingredient in photosynthesis – the process by which green plants grow and produce oxygen – it makes up less than .04 per cent of the atmosphere. But since the start of the Industrial Revolution in the late 1700's the amount of CO₂ in the air has increased by 15 to 25 per cent.

The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO₂. Around half the CO₂ generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, ever higher concentrations of the gas build up. Since 1957, when systematic monitoring of atmospheric CO₂ was started, levels have increased by 7 per cent.

This virtually transparent layer of gas has little effect on the sunlight which passes through it to warm the earth. But infrared heat radiated back into the atmosphere from the planet's surface has a longer wavelength and some of it is consequently trapped by the CO₂, in a process that has been called a "greenhouse effect."

How much has this accumulation actually warmed the world's climate? "We apparently haven't affected the natural systems very much yet," says William Kellogg, a senior climatologist at the U.S. National Centre for Atmospheric Research. "The increase theoretically has been something on the order of one degree Fahrenheit. It's in the same ballpark as the natural fluctuations we've seen over the last 1000 years. When it gets near two degrees, then it'll dominate over the natural processes."

That's what scientists worry about. In the late 1970's,

consumption of fossil fuels increased by about 2.5 per cent annually. If that rate continues, the CO₂ concentrations in the air will be double the pre-Industrial Revolution level by the middle of the next century. Such estimates come from computer models, and their projections frequently do not agree. But most scientists concur that a doubling could raise the earth's average temperature from nearly three to as many as eight degrees Fahrenheit. The increase would be least in the tropics, somewhat greater in the Antarctic and still greater in the Arctic.

A reduction in the temperature differential between the tropics and the polar regions would produce a weakening of the vast heat engine which drives the world's weather – the flow of warm air up from the equator toward the poles and the counterflow of cold air down from the poles toward the equator. At the same time, the surface waters of the oceans would become warmer. Winds which circulate ocean currents might diminish. Since the oceans profoundly influence weather patterns, future changes in temperature, mixing and circulation would have a significant impact on the earth's climate.

All of this could make the poles drier and subtropical regions wetter. However, says David Burns of the American Association for the Advancement of Science, "what the farmer wants to know is whether it's going to rain in July in Iowa." Researchers have been trying, in a general way, to answer such questions. They've not only taken computer climate models into account, but also studied much warmer periods in the distant past.

One projection, based on such a study, shows the midwestern United States, the Soviet Union and northern China as drier, and Europe, Australia, and north and west Africa as wetter. On the basis of this and other scientific projections, the rich midwest corn and wheat belt of the United States could become arid prairie. But the more northern growing regions of the United States, Canada, and Russia could greatly benefit from a longer growing season. Parched areas such as north and west Africa – including the Sahara – Mexico and much of Australia might again turn green. Stronger, more regular monsoon rains could improve growing conditions for the nations of the Indian sub-continent. All told, hundreds of millions of people could be affected – some for better, some for worse.

Indeed, the whole range of potential impacts from a world warm-up is a combination of pluses and minuses.

a) Insect pests, which already destroy more than 35 per cent of the world's crops, would likely multiply in a warmer global climate. Crop diseases could also become more of a threat.

b) Increased carbon dioxide in the air, which can enhance photosynthesis, could lessen the requirements for water and boost the yields of some crops.

c) The intricate balance of natural ecosystems could be upset. For the most part, wildlife would migrate with the climate, and survive. But species that live in specialized habitats might become extinct. Boundaries of some reserves and parks set up to save endangered species could become meaningless as rainfall and vegetation changes.

d) Changes in ocean circulation and temperatures could hurt fisheries by disrupting the "upwelling" process which brings nutrients up from the depths.

e) The west Antarctic ice sheet could eventually melt. As a result, coastal areas throughout the world would be inundated. One study estimates that about 12 million North Americans would be uprooted, including more than 40 per cent of Florida's population.

All of this may come to pass – drastically changing the world as we know it today. But scientists are the first to concede the uncertainties. Take the various computer climate simulations, for example. These models are oversimplifications of extremely complex and imperfectly understood geophysical systems. The dynamics of oceans – their heat transport, currents and interactions with the atmosphere – are unclear, for instance. Add in other effects, such as the inter-relationships of land masses, snow and ice, vegetation and wind circulation, and the task of simulating future climate becomes complex indeed.

Just as perplexing is the question of how long it will take for the atmospheric concentrations of CO₂ to double from the nineteenth century levels. That depends, in a large part, on the future growth and nature of world energy consumption. From 1940 to 1970, the use of fossil fuels grew at a four per cent annual rate. But soaring fuel prices have dampened demand and lowered that rate to the present 2.5 per cent.

Projections of future energy growth hinge on all sorts of assumptions – development in emerging nations, population increases, price effects, etc. Recessions, wars (especially nuclear), embargoes and other unpredictable events could alter the forecasts.

So could the future patterns of fuel use. For instance, natural gas throws off about 40 per cent less CO₂ per unit of energy than coal, and synthetic fuels emit about one third more. Thus, Soviet plans to tap enormous Siberian gas resources or the development of massive U. S. synfuels industry could affect CO₂ buildup.

There is also the problem of detecting the global warm-up caused by the "greenhouse effect," or, as scientists put it, "separating the signal from the noise." The "noise" is the normal natural fluctuations of the world climate. The "signal" is the CO₂-induced warming. The difficulties are compounded by the probable "lag effect" of the oceans. The oceans could soak up enough excess heat to delay detection of any abnormal warming trend by several decades.

While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the vexing questions, the immediate dilemma is what to do and when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels – through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. Such policies, however, would have to be global. Indeed, they'd require a unique kind of international co-operation.

Another way of attacking the problem is to prepare for a warmer world. That could mean developing drought-resistant crops and new strains that would stand up to higher temperatures and utilize saltier water. It could mean improved irrigation and water management techniques, and better ways of protecting arable soil. It could require global food reserves and plans for massive disaster relief.

How long does the world have to act? Many scientists agree with National Oceanic and Atmospheric Administration climatologist Lester Machta that we have another 10 to 15 years. "The uncertainties are too large," he feels, "to say that some kind of positive actions have to be taken right now." Some agree with former CEQ chairman Gus Speth that the world can't wait until the uncertainties are narrowed before moving.

So far though, scientists have voiced a lot more concern than policymakers. Indeed, the international scientific community is mobilizing to investigate the "greenhouse effect." In 1980, the World Meteorological Organization launched a Climate Impact Studies Program. And the United Nations Environment Program has organized a Global Environmental Monitoring System which is

“assessing global atmospheric pollution and its impact on climate.”

The problem, notes climatologist William Kellogg, is that the “process of climate change is a slow one. And the democratic system isn’t very good at taking long-range problems into account.” But sooner or later, the world may have little choice. As David Burns put it, “we are taking the thin film of air and water upon which life on earth depends and messing around with it in an absolutely fundamental way – without really knowing the consequences of what we’re doing.”



Seminar:

The Canadian Wildlife Federation and the International Wildlife Federation are sponsoring the 1987 International Conference of Climatologists on the topic of the Effects of Burning Fossil Fuels on the World’s Climate, in conjunction with the University of Manitoba, Winnipeg, Canada on Wednesday, May 6 through Saturday, May 9. Keynote speakers will be Gus Speth, former Head, Council on Environmental Quality; David Burns, American Association for the Advancement of Science; Lester Machta, National Oceanic and Atmospheric Administration; and Henry Long, United Nations Environment Program. Besides the speakers, there will be a program of workshops as well as audio visual presentations. Recreational sight-seeing trips will be scheduled daily by coach and riverboat. Wrapping up events Saturday evening will be a banquet at the exclusive la Vielle Gare restaurant. Registration information is available from the Canadian Wildlife Federation, 1673 Carling Avenue, Ottawa, Ontario, Canada K2A 1C4.

PURPOSE

- The wise use of the resources which have been given to man (social resources – so that people can live amicably together): soil use, water use, forest use, animal use, grazingland use, mineral use, recreational use.
- Heating, cooking, manufacture.
- Industrial man has a voracious appetite for energy and the products available from energy use. It is burned directly or processed. Half of all coal mined is burned to produce a secondary source of energy – electricity.

e.g. 1 ton of processed coal yields:

Coke	Coal Tar	Light Oil	Ammonia	Coal Gas
1300 lb	10 gal	3 gal	6 lb	11000 cu ft

these are used to make

Metallurgy	Acids	Benzene	Ammonium	Heating
copper	carbolic	nylon	Sulphate	Sulphur
iron	pharma-	aniline dyes	fertilizers	fungicides
steel	ceutical	motor fuel	chemicals	insecticides
lead	Creosols	plastics	Ammonia	sulphuric
Heating	lysol	synthetic	Liquor	acid
Calcium	photo	rubber	fertilizers	Cyanogen
Carbide	developer	tanning	explosives	cotton
acetylene	plastics	fluids	household	finishing
chemicals	Phenols	Toluene	ammonia	dyes
Water Gas	detergents	antiseptics	refrigerant	
heating	drugs	printing inks	nitric acid	
chemical	dyes	cosmetics	Diammonium	
processing	food	saccharin	Phosphate	
Coke	Coal Tar	Light Oil	Ammonia	Coal Gas
Lime Burning	preserv-	TNT	fertilizers	
Sugar Beet	atives	aviation fuel	fire re-	
Refining	perfumes	detergents	tardant	
Mineral Wool	rubber	Xylene		
weedkiller		motor fuel		
Bases	solvents			
Pyridine	herbicides			
antiseptics		Naphtha		
disinfec-	solvents			
tants	rubber			
paint	cement			
thinner	electrical			
sulfa drugs		insulation		
synthetic		linoleum		
vitamins	varnishes			
Naphthalene				
insecticides				
fungicides				
plastics				
explosives				

- moth balls
- synthetic
- cloth
- Heavy Oils
- dyes
- laxatives
- embalming
- fluid
- wood
- preservatives
- Pitch
- insulation
- paving
- roofing
- waterproofing

● Petroleum is refined and processed to make:

Gasoline 45%

the chief product of petroleum

Fuel Oils 31%

heating oil and diesel fuel

Kerosene 9%

jet fuel

Asphalt 3%

roads and roofing

Lubricants 2.0%

home and industrial

Petro-chemicals 10.0%

because fossil fuels (coal, oil, & gas) consist chiefly of carbon and hydrogen combined in different ways, they can be separated and recombined relatively simply into different substances.

Today at least one quarter of all chemicals used (by weight) come from these sources:

insecticides, herbicides, rust preventatives, detergents, paints, antiseptics, cosmetics, anesthetics, drugs, synthetic fibres, plastics, fertilizers (see list from coal)

Phase 2: Discovering Options

Possible titles for the text for publication
and the seminar

the most important weather forecast ever

the ultimate environmental dilemma

carbon dioxide and the environment

fossil fuels and carbon dioxide

are we changing the world's climate?

fossil fuels and a changing climate

burning fossil fuels: a crisis?

environmental crisis

a climate crisis

the future climate of the world

fossil fuels and future world climate

climatic consequences of burning fossil fuels

atmospheric changes from burning fossil fuels

are levels of atmospheric carbon dioxide rising?

carbon dioxide and future world climate

carbon dioxide and global warming

carbon dioxide and the "greenhouse effect"

fossil fuels and the "greenhouse effect"

greenhouse effect

climatic uncertainty

global climatic uncertainty

fossil fuels: are they creating climatic uncertainty?

fossil fuels: creating a climate crisis?

fossil fuels: a potential catastrophe?

climate catastrophe?

climate crisis?

KEY WORDS: description and text

climate sunshine sky earth weather clouds rain snow hail wind
 drought dry heat cold hail sleet winter heating furnaces oil tanks
 coal smoke summer spring autumn leaves trees growing
 planting seeds sprouts food groceries population greens cans
 bags bottles safeway parking-lots cars shopping-carts
 supermarkets traffic-jams cities exhaust-fumes trucks
 carbon-monoxide carbon-dioxide air oxygen pollution atmosphere
 smog congestion burning-eyes streets highways driveway
 cooking kitchens pots pans chopping cutting knives forks
 drudgery stove heating-element barbeque coals dinner-party
 candlelight matches poor/rich fireplace firewood chimney
 electric gas campfire hot potatoes parks camp-grounds smoke
 chopping-firewood forests plains fields farming growing-zones
 maps deserts grass wildlife buffalo prairiedogs foxes rabbits
 jungles parrots rainforests monkeys tigers elephants giraffes
 deer hunting waterfowl wetlands swamps mosquitoes swallows
 redwings warblers robins lawns lawnmower gasoline sparkplugs
 backfire engine stink hard work tired drink shower hot water
 water heater fuels research solar energy chemistry factories
 physics windmills climatology seasons warming trend greenhouse
effect ocean currents tides water-energy waterfalls

hydro-electric power lines mining smelting fossil fuels: coal oil gas
refineries stink tanker-trucks tanker-ships oil spills dead birds
dead trees spoiled beaches barbecue on beach floodings muck
 cleanup crisis changing landscapes migrations famine disrupted
lives political unrest wars death

KEY WORDS : Wildlife Federation

wildlife animal forest grassland stream sky man
 erosion vegetation habitat humus irrigation watershed waterway
 strip cropping fallow runoff terracing drainage lowlands wetlands
 plant cover flooding flood control sewage land reclamation dikes
 dams ground water artesian wells countries flags continents
 patriotism armies war refugees groups seminars round-table
negotiations confrontation handshakes embrace fraternity storms
 hurricanes tornadoes acid rain CO2 trapping for fur fur farming
 game tree farming fish farming aquifers songbirds for pleasure
animal muscle power bird population regeneration predation animal
ornament & armament eiderdown return of the whooping crane
 the flourishing flamingo the world: brimming with birds bird
 migration and human settlement human habitation: tempting the
fury of nature man eaters: not many ravaged jungle land
 development: no place to hide creeping deserts man in nature:
hopeful, scary, benign, tumultuous, amusing, grim, unpredictable,
 medicine, fun, beautiful, background, environment bird as symbol
 robin, owl, chickadee, nuthatch, crane, crow, hawk, Canada Goose,
 duck, merganser, loon, etc. aviation freedom elusiveness

plumage changes with seasons presence of different species in
different seasons juvenile plumage and adult plumage

T R O P E S: publication text

Metaphor:

- we're handling a hot potato
- our goose is cooked

Personification:

- the world is perspiring under the radiant sun of the "greenhouse"

Synecdoche:

- the coal bin by the hearth is a world of heat
- the matchsticks heat the earth

Metonymy

- the coals burn rubies in the grates of the world

Hyperbole:

- the globe is aflame in the heat of the sun

Amplification:

- the coal bins, gas meters, refineries, chimneys, heavy vehicular traffic, air pollution, concerned people, and other tropes

Periphrasis:

- the gypsy gazes into her crystal orb to see what the future of fossil fuels and world climate might be

Irony:

- a gas powered refrigerator

Antithesis:

- polar/desert: the freezing ice cap/the burning and parched desert

TROPE S: Wildlife Federation

Metaphor:

- resource management solutions:
as elusive as white rabbits in a blizzard
as elusive as birds in the bush

Personification:

- with a wild touché the porcupine brought his arsenal to bear on the unsuspecting hunter

Synecdoche:

- resource use lies in the hand of man

Metonymy:

- the silence of the forest was heard in the hunter's cottage

Hyperbole:

- the fall of the last feather shook the world

Amplification:

- the key elements of conservation taken together in round-table negotiations can win the day: forest management, wildlife management, acid rain, CO₂, soil erosion, etc.

Periphrasis:

- in harmony with nature
- man sits in on the symphony of nature

Irony:

- to control nature is to lose nature

Antithesis:

- man as hunter destroys the very things that allow him to be a hunter

2.2 Synthesis
(See Part 2, Section 4.4.4)

Phase 3: Visual Transformation

Phase 4: Realization

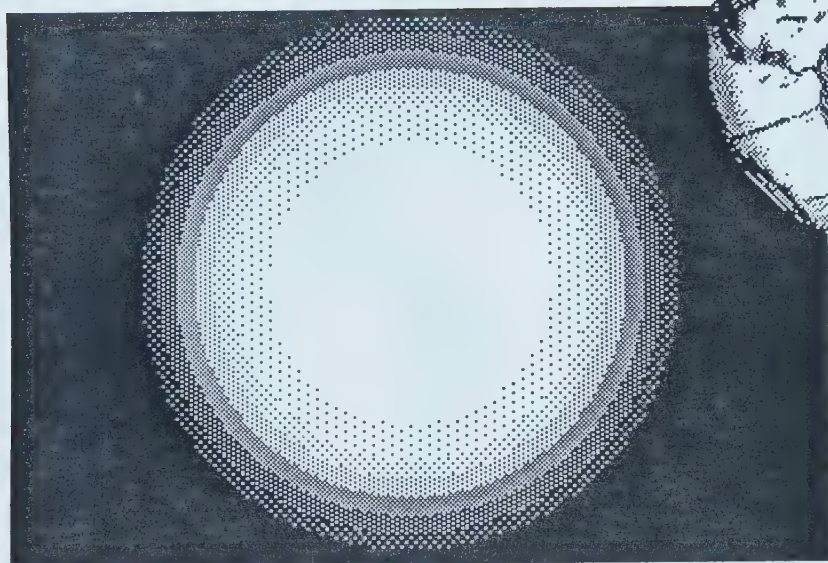
In the use of digital technology graphic realization is an integral part of the process of transformation.

Visualization of Keywords and Phrases

First a selection of promising keywords and phrases is made. These concepts are then directly “pictured.” No concern is necessarily given to their ultimate use in the document in question. Once digitized the bit-maps can be further edited as required. But it is important that the pictures possess potential, and are considered from various pairs of the attributes of visual form listed below. The pictures may or may not be included in the final document, or they may provide a stimulus for other pictures.

attractive/unattractive
eye-catching/insignificant
interesting/boring
usual/unusual
simple/complex
inviting/uninviting
active/passive
strong/weak
bright/dull
good/bad
up-to-date/old fashioned

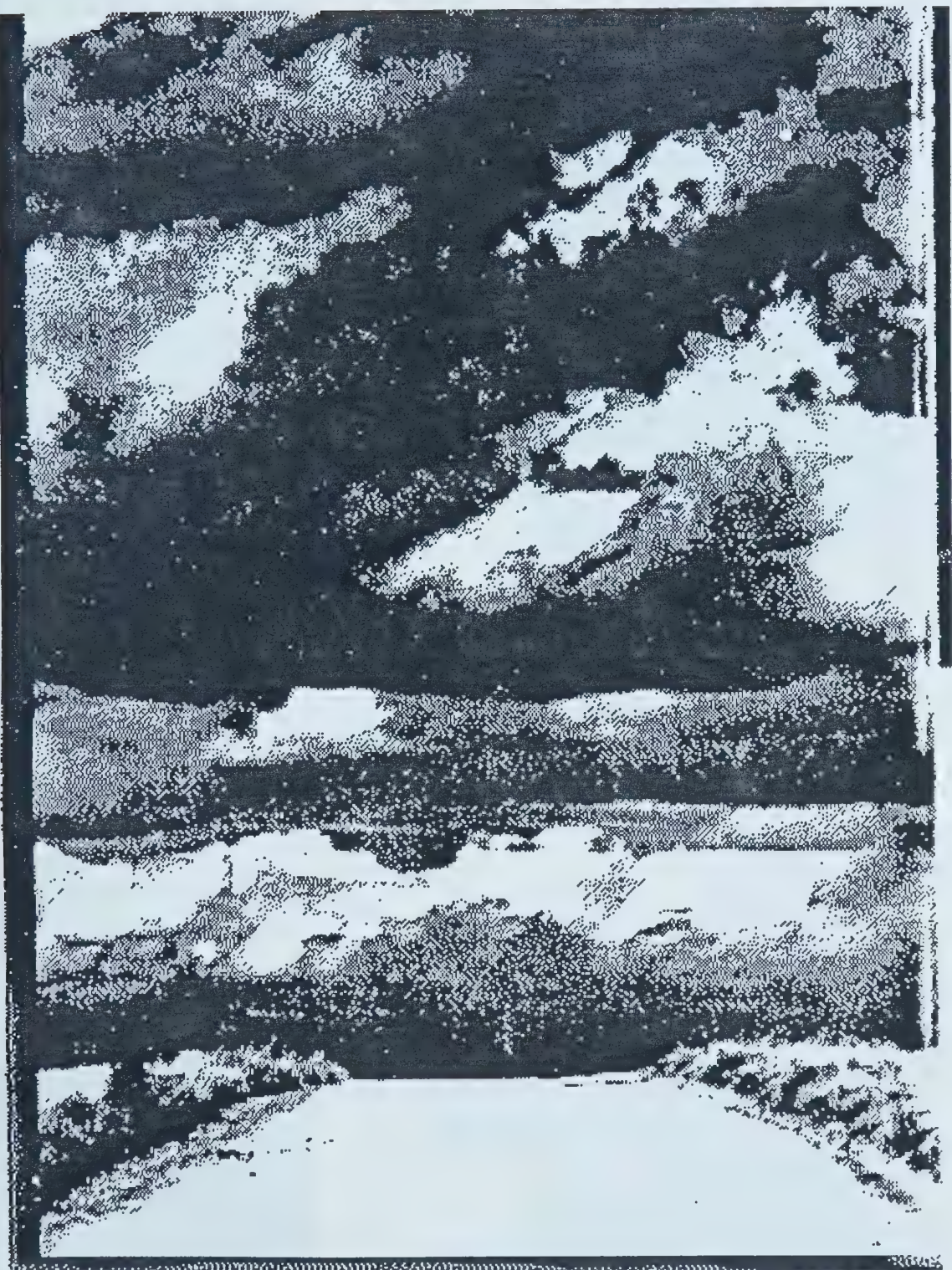
sun / earth



world climate

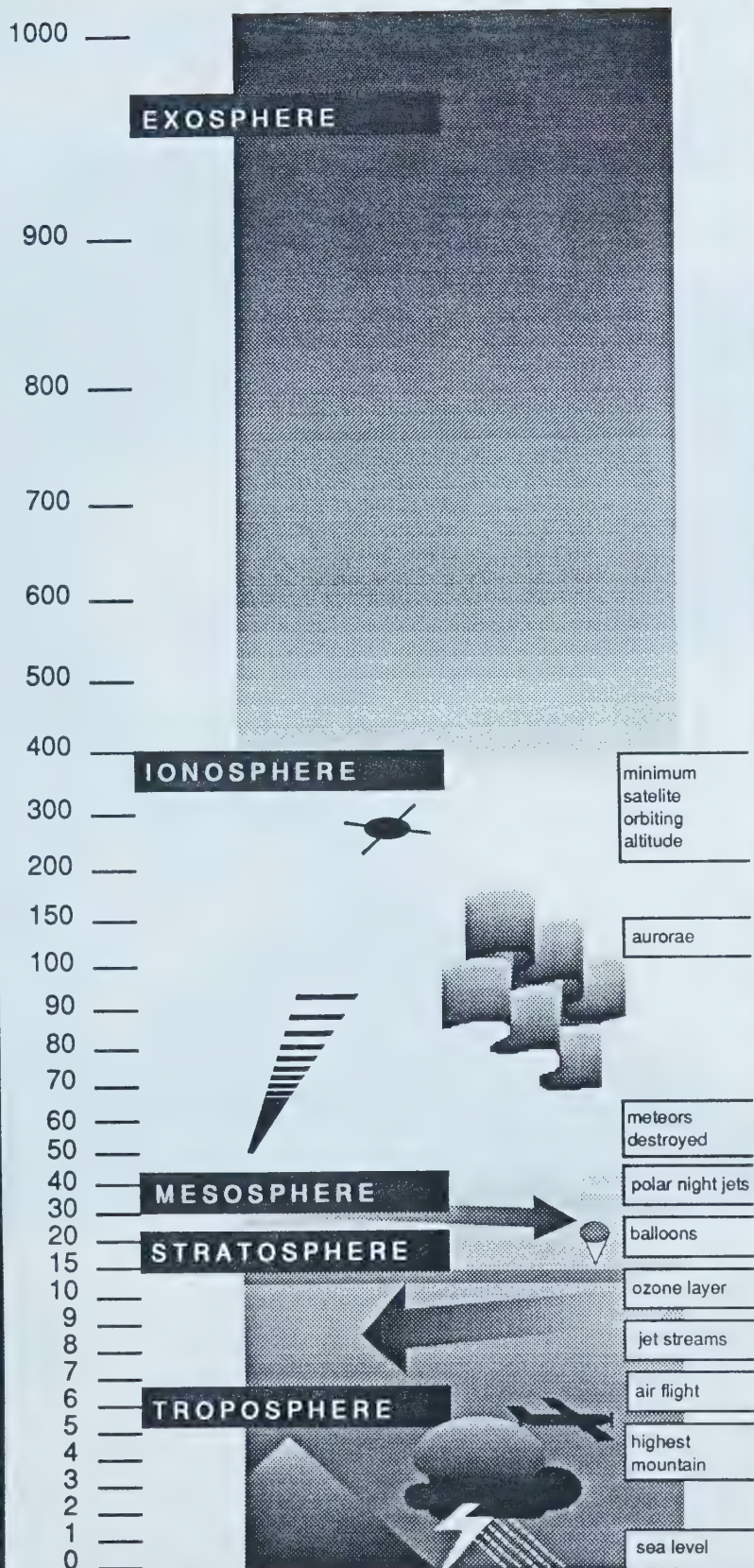
- 1 rainy tropical
- 2 wet/dry tropical
- 3 semiarid
- 4 desert
- 5 warm rainy
- 6 w/r dry summer
- 7 cold moist
- 8 polar
- 9 ice cap





climate

The earth's atmosphere has a layered structure, with decreasing density as altitude increases. The layers that directly affect life as we know it on the planet, are the relatively shallow bands near the surface no more than 40 miles deep. Besides supporting life, the atmosphere serves as a protective screen against small particles and radiations from space. Meteors are normally destroyed about 40 miles above the surface of the earth; the ozone layer, predominantly at 16 miles, blocks out most of the incoming ultra-violet radiation. Weather is confined to the Troposphere, the dense band of atmosphere that is home to life on earth. **And it is in this thin band we are polluting by the increased burning of fossil fuels in some heating, transportation, and industrial production.**



sunshine

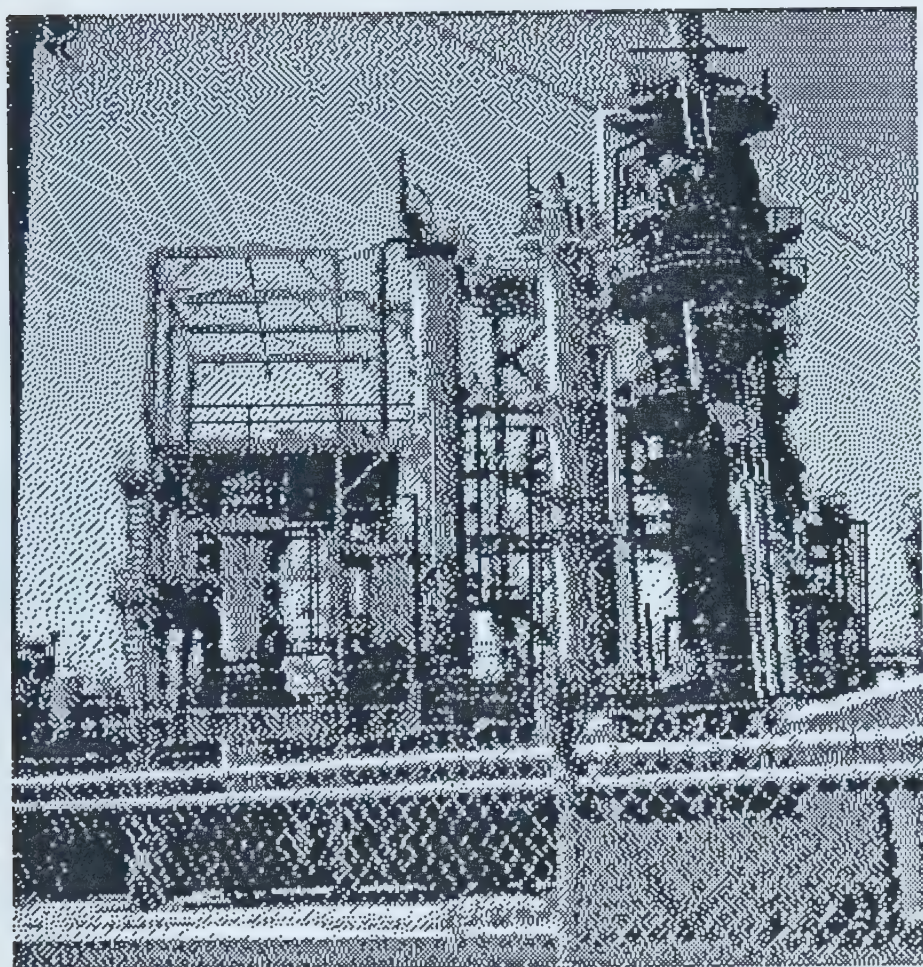




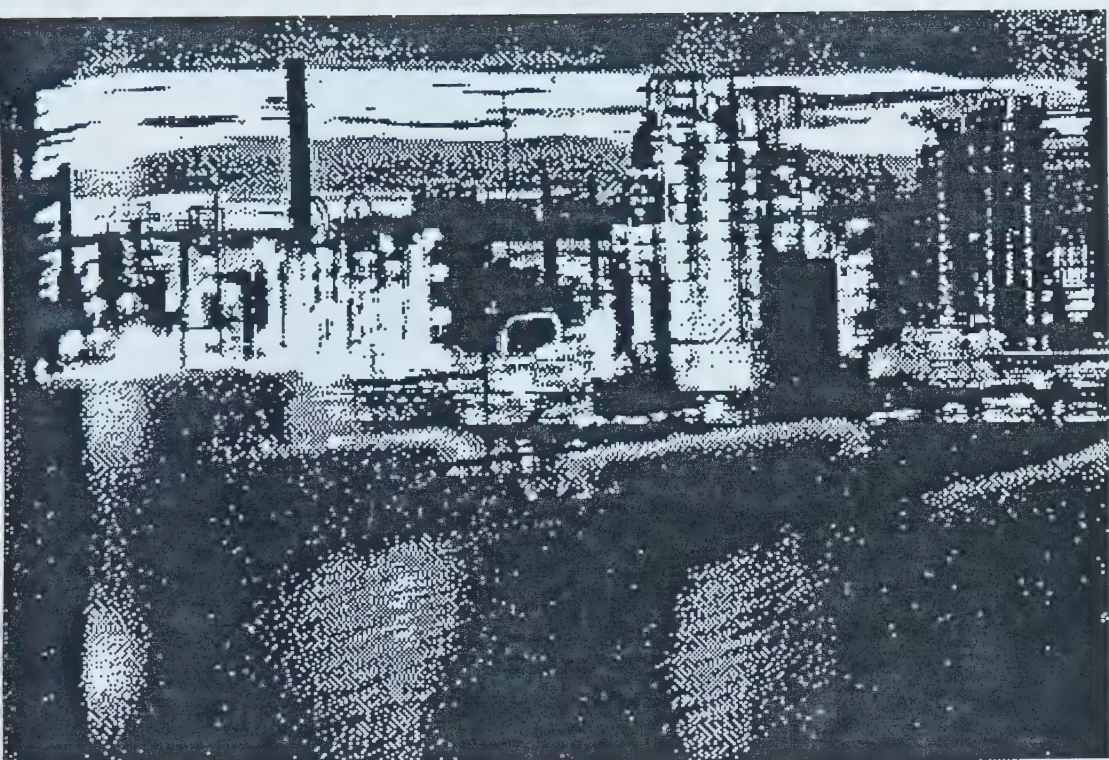
fossil fuels
& CO₂



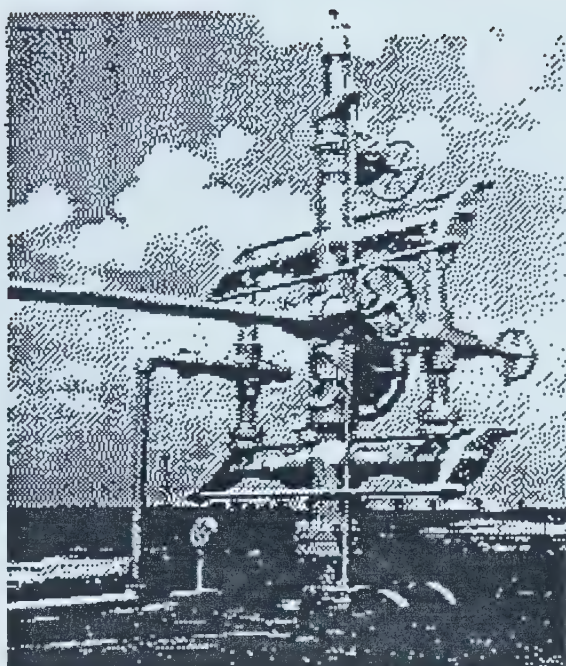
fossil fuels



fossil fuels: refinery



fossil fuels: refinery

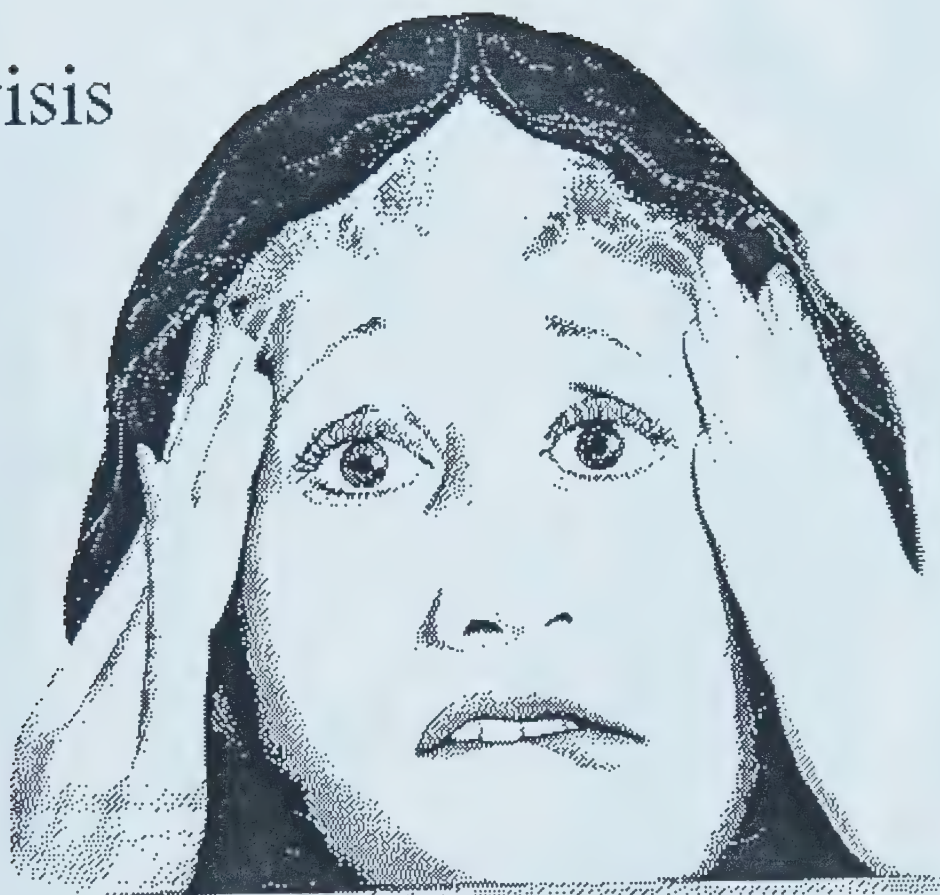


fossil fuels



fossil fuels & CO₂

crisis

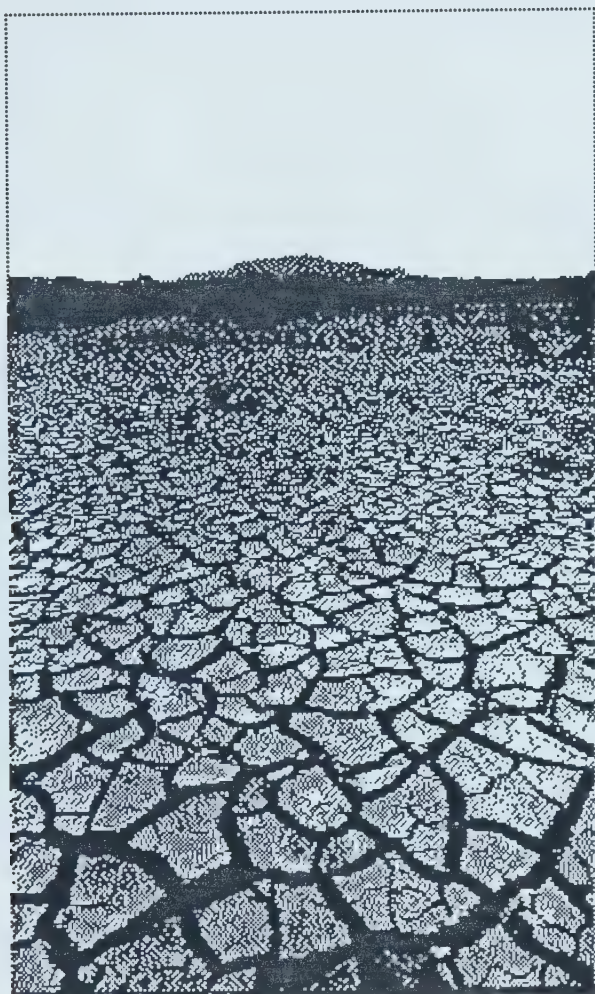


spoiled forest

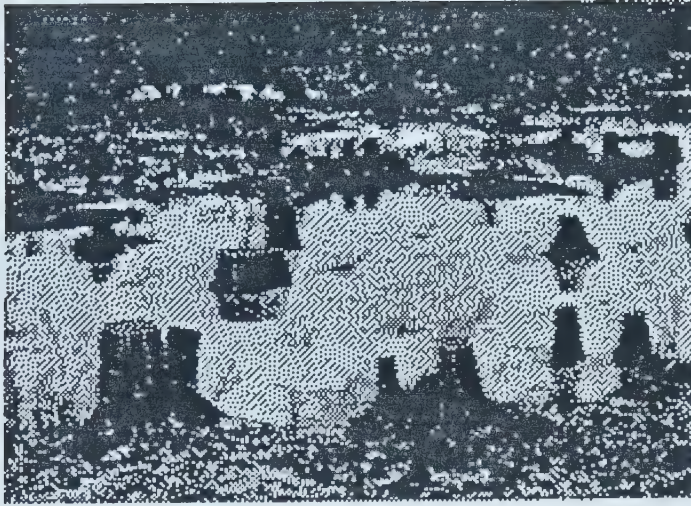


crisis





changing
landscape



changing landscape



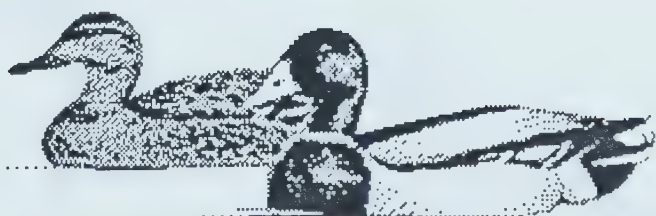
family life

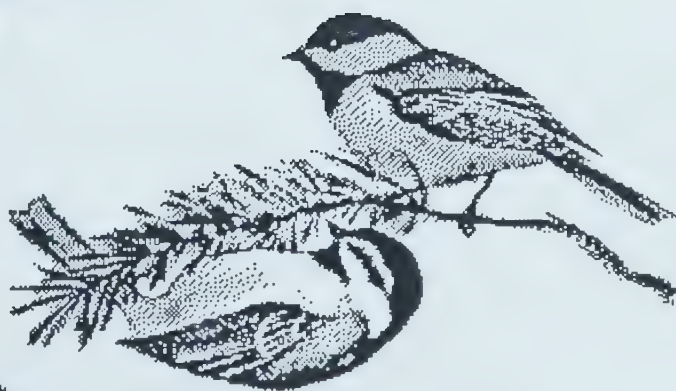
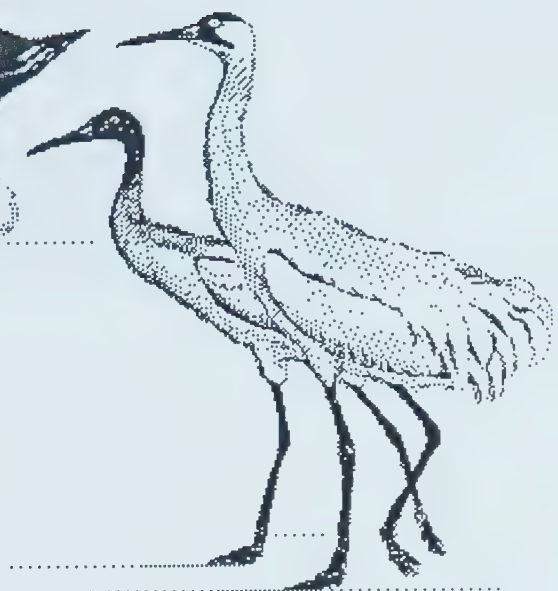


family life



family life





Tropes Derived from the Description and the Text

Various written rhetorical figures become the source for being “pictured.” It is here that the “metaphor process” of language and the contextual nature of concepts is strongly in evidence. In each trope the concept is pictured by something which out of the context could have a different meaning entirely. The attributes of visual form are again to be considered:

attractive/unattractive
 eye-catching/insignificant
 interesting/boring
 usual/unusual
 simple/complex
 inviting/uninviting
 active/passive
 strong/weak
 bright/dull
 good/bad
 up-to-date/old fashioned

Metaphor: the situation of a raised global temperature is like the proverbial “cooked goose.”

Personification: Human qualities are assigned to the world – a perspiring globe.

Hyperbole: An exaggeration of the condition of a rising world temperature.

Synecdoche: A small part of the problem in question is shown to represent the whole.

Metonymy: The grill with hot coals shows a heightened sense of the problem of warming. It shows the cause to represent the effect.

Periphrasis: The problematic nature of global warming is indirectly shown by the gypsy and crystal ball (which is represented metaphorically by the globe).

Irony: The warmer the world the more refrigeration is required and the more fuel is consumed to add more CO₂ yielding an even warmer world.

Antithesis: The frozen parts of the world melt and yield increasing water levels; wetlands evaporate leaving parched earth.

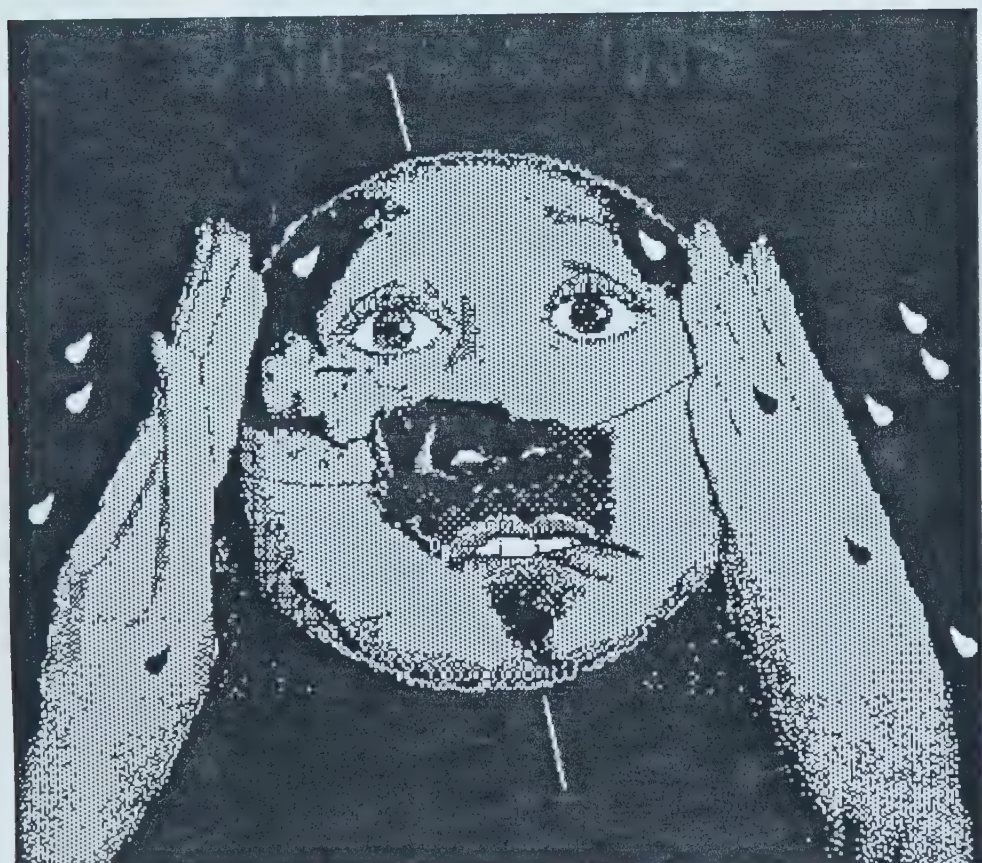
climate crisis ?

Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.



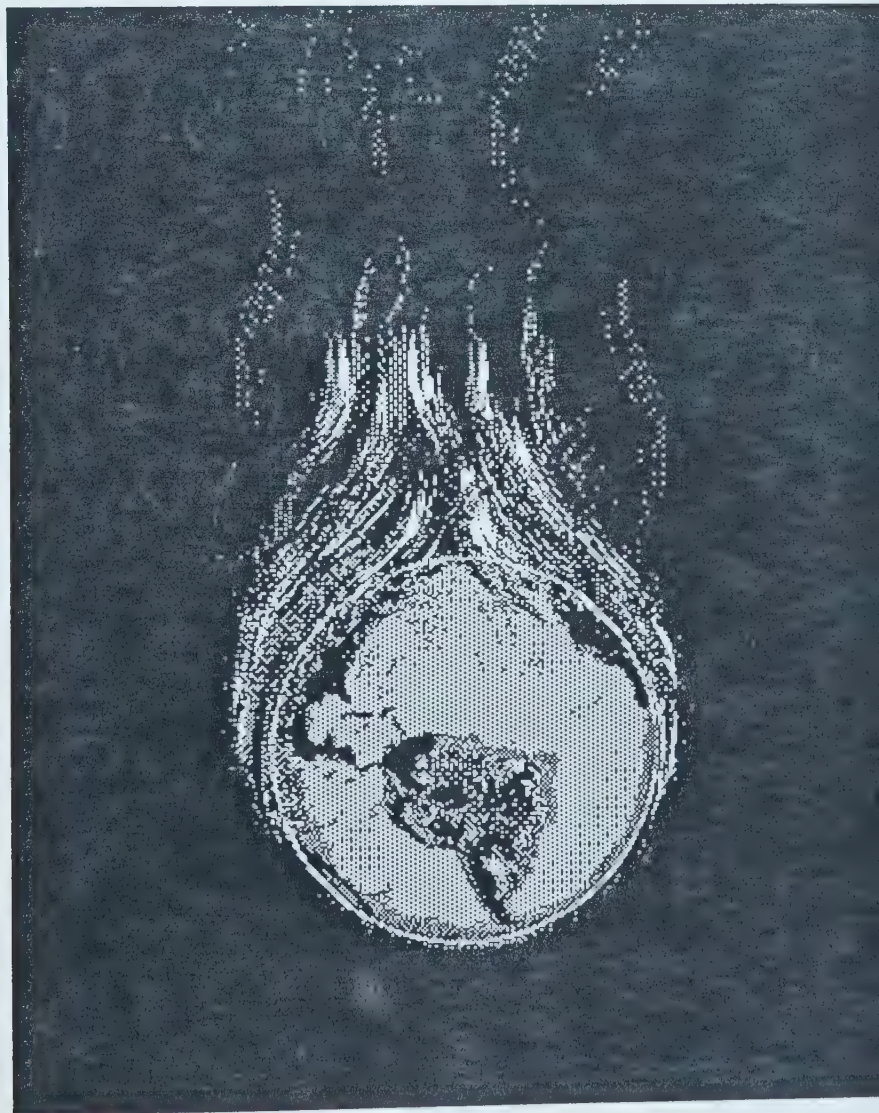
climate crisis ?

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climate crisis ?

Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.



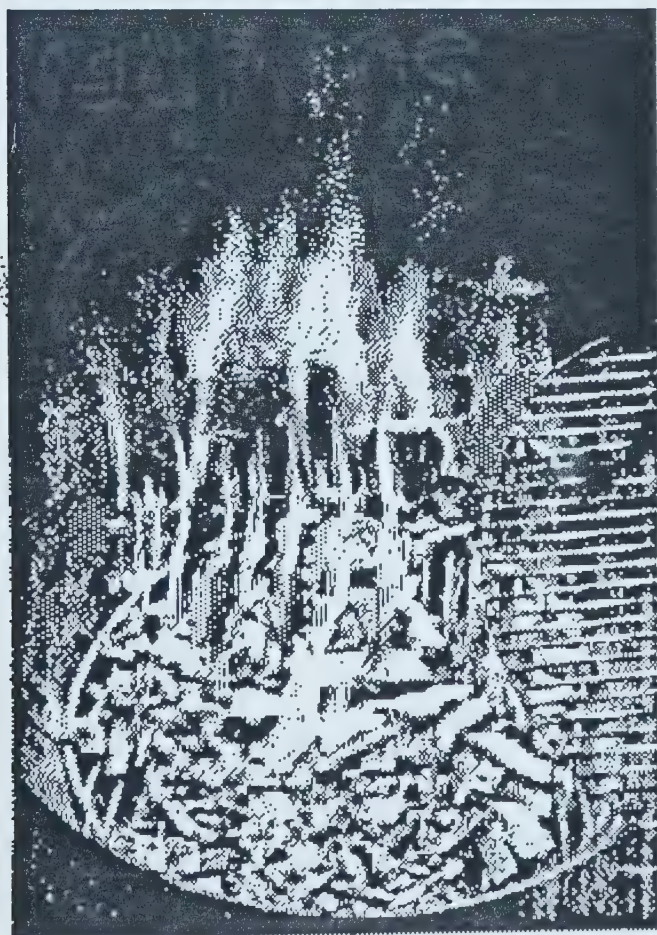
climate crisis ?

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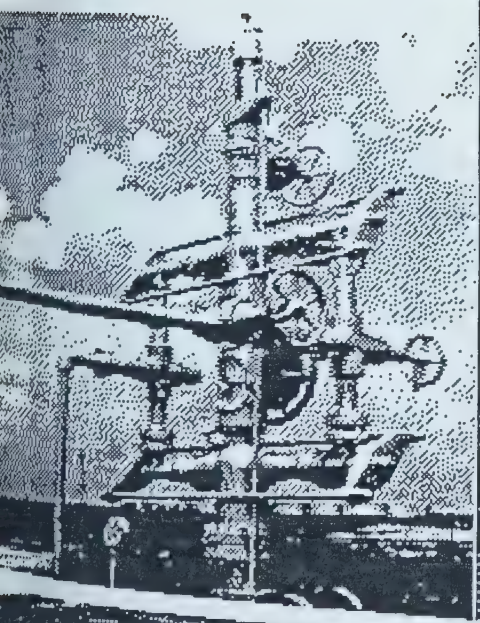
climate crisis ?

Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.



climate crisis ?

Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.



climate crisis ?

Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.



Tropes Derived from the Wildlife Federation

Metaphor: Wildlife management is as difficult as seeing the elusive birds in the bush or as invisible as the forest in the trees. Birds and trees are integral aspects of the problems of the Federation.

Personification: Human attributes are given to the porcupine and the defensive armament is recast as a human's offensive weapon – the thrust sword.

Synecdoche: The hand is shown to represent the whole management problem – (1) flora (2) fauna.

Metonymy: A heightened sense of urgency is suggested when the cause (poor control of wildlife management) is shown for the effect. The earth is slipping from our grasp.

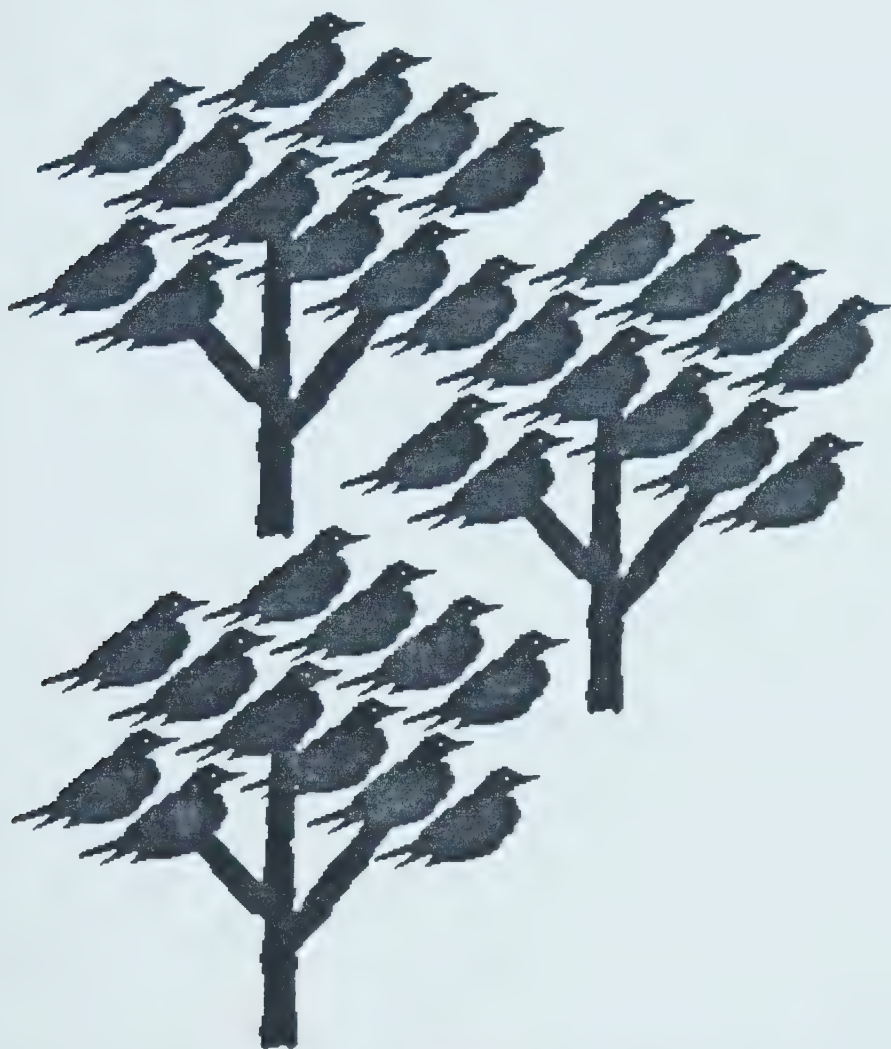
Periphrasis: Good wildlife management is suggested by the parallel between the harmony of music and the harmony of living with nature.

Irony: In wildlife management the more we attempt to control nature the more we lose nature.

TROPE

metaphor

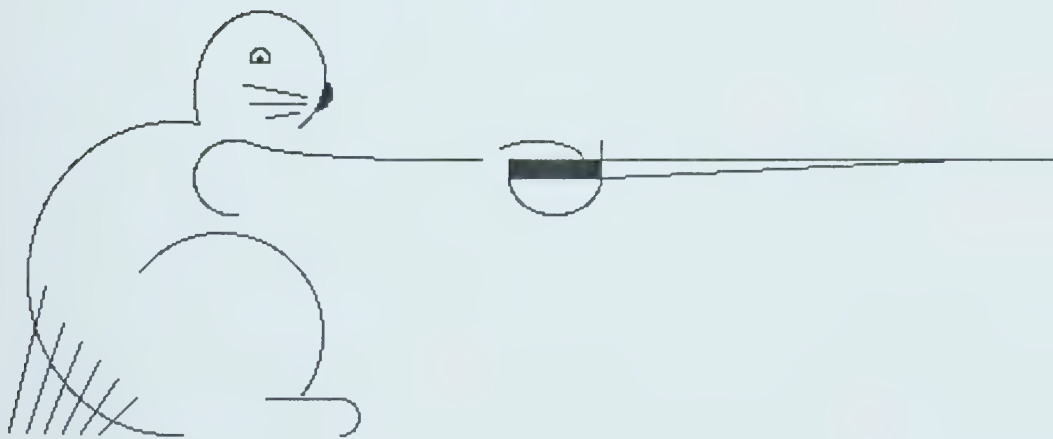
dedicated to the wise
use of the earth's
resources



TROPE

personification

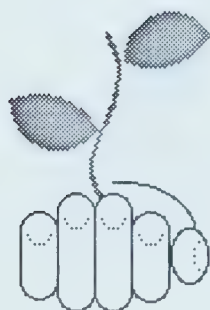
dedicated to the wise
use of the earth's
resources



TROPE

synecdoche 1

dedicated to the wise
use of the earth's
resources



TROPE

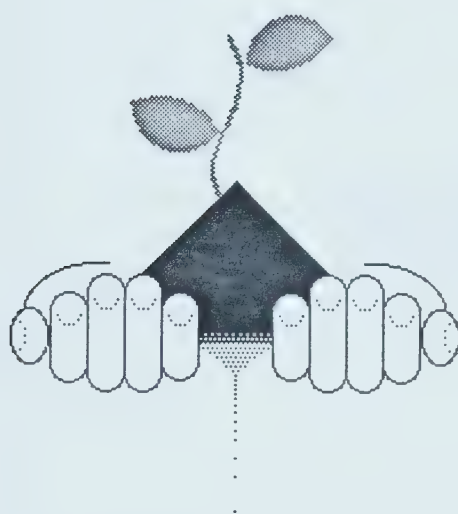
synecdoche 2

dedicated to the wise
use of the earth's
resources



metonymy

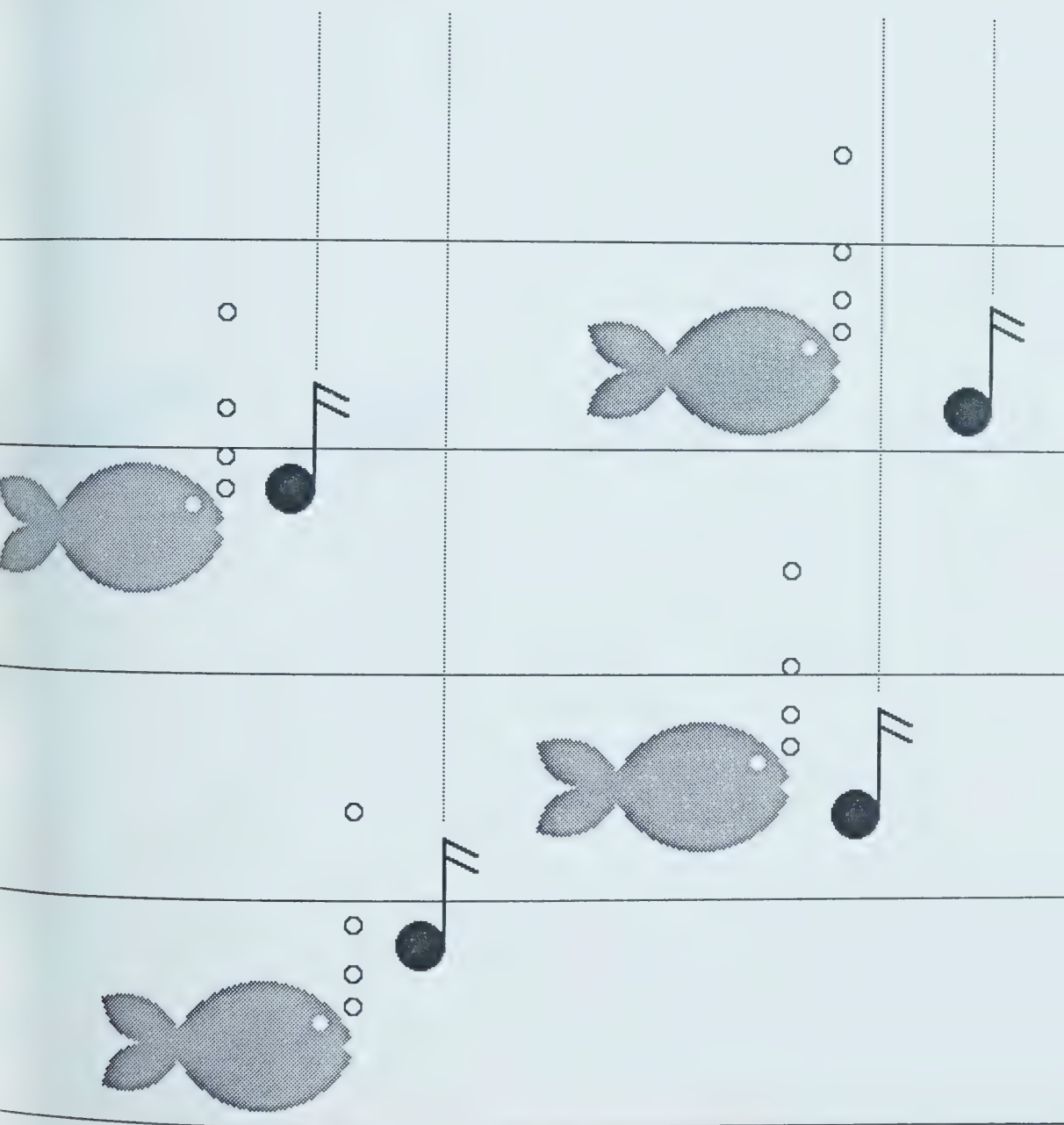
dedicated to the wise
use of the earth's
resources



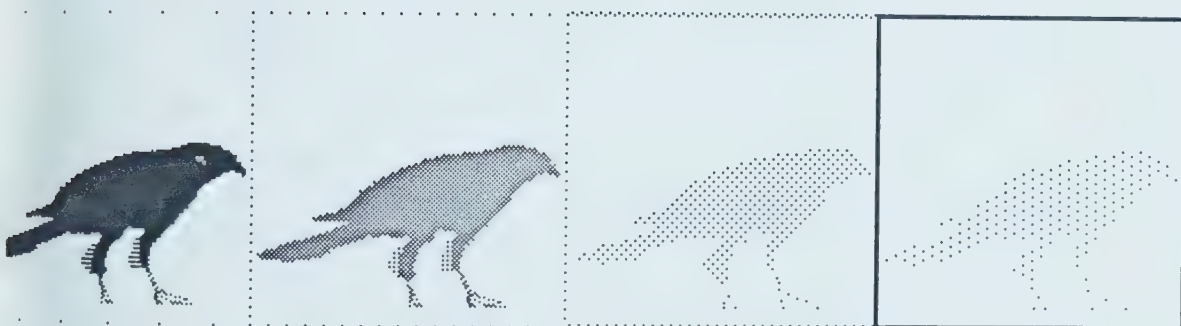
TROPE

periphrasis

dedicated to the wise
use of the earth's
resources



dedicated to the wise
use of the earth's
resources



2.2.1

Visual Transformation: Broadsheet**Group 1**

In this group of images some of the possibilities of typographic composition are explored. Each plate constitutes one step in a process in which different configurations are made in the attempt to find one that suits the hierarchy of the relative importance of the various phrases in the text. This process follows the traditional procedure of first dividing the page into sections and then placing text into the divisions. A progressive grid, in which each division doubles the size of the previous one, was chosen as the starting point because of the complexity of the concepts to be represented on the broadsheet. This work is best performed with software that is object-oriented in which each phrase is independent and can be altered in typeface, size, weight, etc. and can be repositioned anywhere in the page. Once the text has been entered a number of duplicate copies can be made and changes made to each one.

Group 2

Plate 2a is the result of the process. The typography conveys the urgency suggested by the title. It is also the first step in another series of transformations.

In plate 2b a visual representation of a trope (hyperbole) is added to the text. In it there is an exaggeration of the condition in question. The trope works because the continued burning of fossil fuels does actually increase the temperature of the globe. There is a direct connection between the statement "crisis" in the title and the exaggeration pictured.

Plate 2c shows a different approach. It shows a pictogram placed directly above the title and consisting of four trees that progress from full foliage to dead and falling over, symbolizing the effects likely to occur if the world temperature is raised. The pictogram has a reduced level of iconicity. The grid in this image is not merely used to divide the space but parts are coloured to give contrast to various of the phrases and provide greater visual presence to the poster.

Plates 2d and 2e constitute a more freely expressive interpretation of "climate crisis" and are a synthesis of various different images. More of the grid is pictured and integrated into the

whole image. Some of the typographic elements emphasize, others obscure the words according to the relative importance of the text. The gravity of the condition in question is indicated by picturing a map of the world. The picture provides a context for the title. In plate 2d some phenomena of climate are included as small pictographs having a reduced level of iconicity. In plate 2e pictures having a greater degree of iconicity are included. In these two examples, because words, grid, and pictures are integrated into a more complex visualization there is a higher level of opacity in the image.

In plate 2f no grid was used as a starting point making use of the ways in which the personal computer can integrate various elements in the page directly. The visualization began with the trope (periphrases) in which there is an indirect reference to the uncertainty of world climate by picturing the world as a crystal ball into which a gypsy is peering. The text and other visual elements are then added to complete the composition. In the process various portions of the picture seem to be cut away or overlaid by other elements.



These images are experimental in that they explore some of the aspects of the topic rhetorically and visually synthesize them differently. They are not based on any analysis of sensibilities of different audiences. Different images appeal to different audiences. No attempt has been made to prioritize their relative degrees of persuasive weight. The simpler compositions, depending more on verbal and visual symbolism, appeals to the professional climatologists because of their increased special knowledge of the topic. The more complex compositions make a more ready appeal to the general audience. Periphrases, because of its indirect nature, would appeal to those with the least knowledge of the topic. Being posters, consideration must also be given to the fact that viewing time may be comparatively short, making the more complex images more difficult to comprehend. Both low and mid-range resolution have been used in the output of the images. Either could be appropriate depending on the actual use of the poster, low resolution images serve perfectly well for certain types of notices.

The
Canadian Wildlife Federation
and the
International Wildlife Federation
are sponsoring the
1987

International Conference of Climatologists
on the topic of the

Effects of Burning Fossil Fuels on the World's Climate,
in conjunction with the

University of Manitoba, Winnipeg, Canada
on

Wednesday, May 6 through Saturday, May 9.

Keynote speakers will be

Gus Speth, former Head, Council on Environmental Quality;
David Burns, American Association for the Advancement
of Science;

Lester Machta, National Oceanic and Atmospheric
Administration;

and

Henry Long, United Nations Environment Program.

Besides the speakers, there will be a program of **workshops** as
well as **audio visual presentations.**

Recreational **sight-seeing** trips will be scheduled daily by coach
and riverboat.

Wrapping up events Saturday evening will be a **banquet** at the
exclusive la Vielle Gare restaurant.

Registration information is available from the
Canadian Wildlife Federation, 1673 Carling Avenue,
Ottawa, Ontario, Canada K2A 1C4.

Climate Crisis?		
		Canadian Wildlife Federation International Wildlife Federation
Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.		International Conference of Climatologists University of Manitoba Winnipeg Canada
	Gus Speth Former Head Council on Environmental Quality David Burns American Association for the Advancement of Science Lester Machta National Oceanic and Atmospheric Administration Henry Long United Nations Environment Program	speakers workshops audio-visual displays sight-seeing trips daily by coach and riverboat with banquet at the la Vieille Gare restaurant Saturday evening Registration: Canadian Wildlife Federation 1673 Carling Avenue Ottawa, Ontario Canada K2A 1C4

1987

climate crisis?

speakers
workshops
audio-visual
displays

Increased burning
of fossil fuels is
leading to a global
warming trend
which could
profoundly affect
the way we live.

Gus Speth
Former Head
Council on Environmental
Quality

David Burns
American Association for the
Advancement of Science

Lester Machta
National Oceanic and
Atmospheric Administration

Henry Long
United Nations Environment
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Canadian Wildlife Federation
International Wildlife Federation

International Conference of Climatologists

University of Manitoba
Winnipeg Canada

sight-seeing trips daily by coach and riverboat with banquet
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Registration:
Canadian Wildlife Federation
1673 Carling Avenue
Ottawa, Ontario
Canada K2A 1G4

1987

University of Manitoba
Winnipeg Canada

Increased burning of fossil fuels is leading to a global warming trend which could profoundly affect the way we live.

climate crisis?

Gus Speth
Former Head
Council on
Environmental
Quality

workshops
speakers
audio-visual displays

sight-seeing trips daily
by coach and riverboat
with banquet at the la Vielle
Gare restaurant
Saturday evening

David Burns
American
Association
for the
Advancement
of Science

Lester Machta
National
Oceanic and
Atmospheric
Administration

Henry Long
United Nations
Environment
Program

Canadian Wildlife Federation
International Wildlife Federation

International Conference of Climatologists

Registration:

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1673 Carling Avenue
Ottawa, Ontario
Canada K2A 1C4

University of Manitoba
Winnipeg Canada

Canadian Wildlife Federation
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1987

Increased burning
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climate crisis?

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PLATES
Group 2

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**Fri
May 8** **Lester Machta**
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Oceanic and
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**Sat
May 9** **Henry Long**
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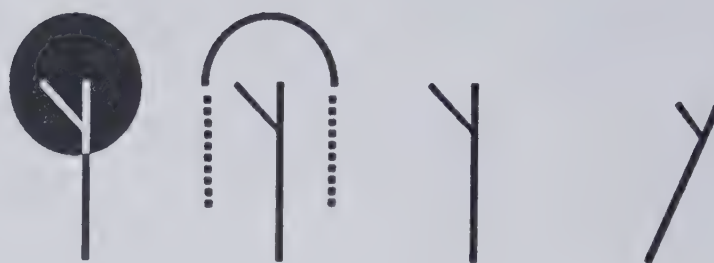
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*Climate
Crisis?*

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workshops
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audio-visual
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evening
Saturday
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2.2.2

Visual Transformation: Booklet**Group 3**

This group of images consists of an eight page booklet variously presented. The design is based on a page division consisting of a regular grid of twelve squares. Traditionally the page has necessarily been divided before any work can be begun. The scribe rules out the text area, the hand typographer sets the measure of the stick, and the machine operator sets the line length of the column. Once these factors are fixed for a given block of text there is little possibility of changing them (except on pain of redoing the work). For many kinds of work the grid is an efficient way of handling the elements of the page. In books, for example, consisting only of text, or in periodicals, where the pages are assembled over a period of time and by a number of different individuals, this approach serves very well.

Plate 3a is a typographic treatment of the subject. To relieve the monotony of the text a lead-in at the beginning and small blurbs positioned at the heads of the columns have been created. They serve as a separate "story" giving a synopsis of the main subject. They might be all that some readers would look at. The black dots emphasize horizontality. The main text simply flows to fill the columns. The beginning and the end are punctuated by a larger black square and a question mark to indicate the uncertainty of the subject.

In plate 3b pictographs, having a reduced degree of iconicity, have been added to illustrate the title page and accompany the blurbs. The reduced iconicity lends emphasis to the symbolism of the pictures. In both 3a and 3b the rationality of the grid and the rigidity of the column is in evidence in the positioning of the elements.

In plate 3c the pictographs are made to be more descriptive of the things they refer to. Other pictures having a relatively high degree of iconicity and being visually descriptive of various aspects of the subject are added. Visual elements cut across the columns giving both horizontal and vertical movements to the pages.

3d includes a trope (irony) to illustrate the title. The refrigerator will of course keep on cooling food as temperatures rise but in doing so it will require more of the very fuel that is causing the temperature to rise in the first place. The treatment of the pictographs and the pages is like that of 3c except that the columns

and the placement of pictorial elements are used to separate thought groupings found in the text.

Group 4

This group consists of a series of experimenting with the visual expression of the concepts being stated verbally. Also shown is the way in which the personal computer can be used to juxtapose different words and pictures to make them interact in space. Rendering an object in black, white, a shade of grey, or in a pattern is an easy matter in digital imagery. Hence type can be just as easily black on a white ground or reversed. It can be run over pictures or objects, cut into them, or be dropped out, all with equal ease.

Group 5

This group demonstrates a different approach to the composition of the booklet based on the principles demonstrated in group 4 and provide a contrast to the examples in group 3.

Plate 5a, like 3a, is a typographic treatment of the subject. But because of the way in which the computer can handle text, it is broken into thought groupings right from the start. Although written language is by its nature linear and therefore subject to being placed into columns, text can easily be broken into smaller blocks having different line lengths. Differing emphases can easily be given to letters, words, or phrases as desired through the use of size changes, bold type, italics, reversed type, etc., as well as geometric shapes. This yields a much livelier texture to the pages. The blurbs must therefore be given greater visual presence, which is accomplished through the use of a strong shape repeated for each one. The overall composition is much more dramatic and expressive of the words stated.

In 5b, like in 3b, pictograms (having a reduced degree of iconicity) are added to illustrate the title and to accompany the blurbs. Their symbolism is integrated well into the complex texture of the page compositions and the symbolism of words.

In 5c more visually descriptive pictograms with a higher degree of iconicity are used to accompany the blurbs, as well as other pictures, also having a high degree of iconicity to illustrate the text. These focus on the fact that people and family life could be seriously affected. The title is illustrated with a trope (metaphor). If the increased temperature occurs then the world is like the goose in the

proverb.

5d maximizes the capabilities provided by the personal computer and various software programs. In this version of the booklet large type, small type (text), pictures (having varying degrees of iconicity), positive shapes, and negative shapes are integrated fully into the dynamics of the page compositions. All are active participants in the drama of getting ideas off the page and into the readers' minds. The title is illustrated with a trope (synecdoche) being integrated into a larger visual description of the crisis that might be at hand. Typographers are accustomed to thinking of "text" as texture. The freely expressive integration of words and pictures possible with the personal computer challenges the traditional definition because the entire page becomes a texture. Because the pages appear to have a great deal going on, careful use must be made of white space and visual structures if readers are not to be left in a state of confusion. One element must be played against another so that the reader can see component parts in the page and can follow some sequence of reading. In this approach even a casual perusal will yield some understanding of what is being stated because the sense of urgency is dramatized through the juxtaposition of word-concepts and picture-concepts. Readers can select which details will be read or omitted.

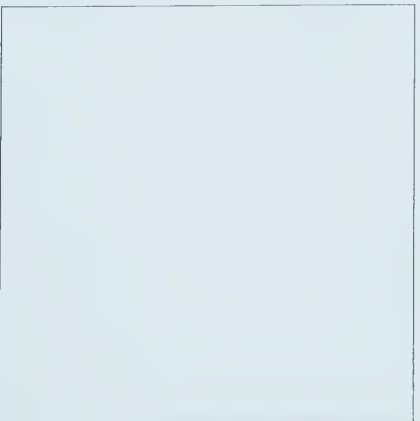
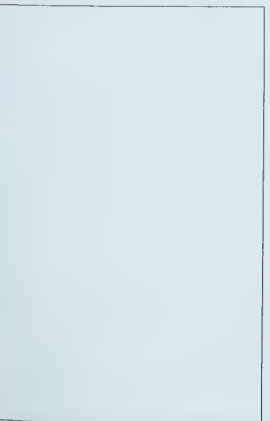
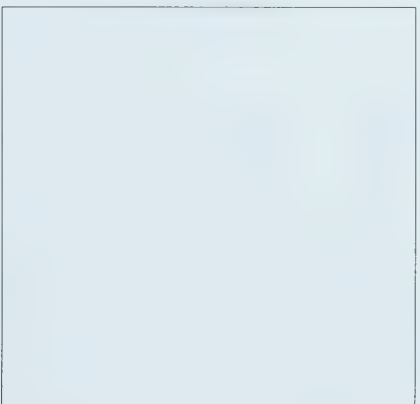
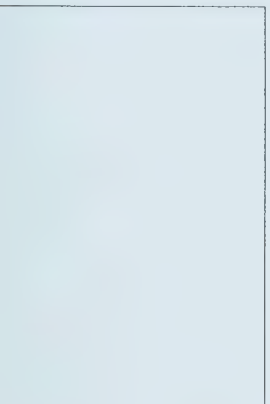
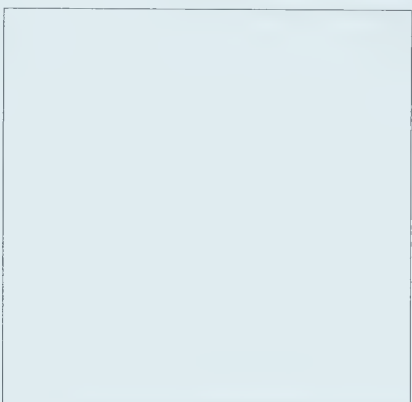
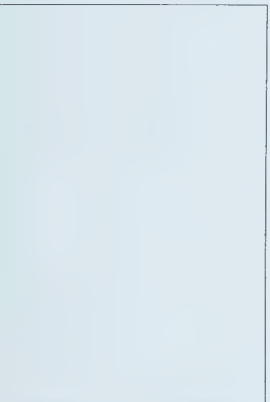
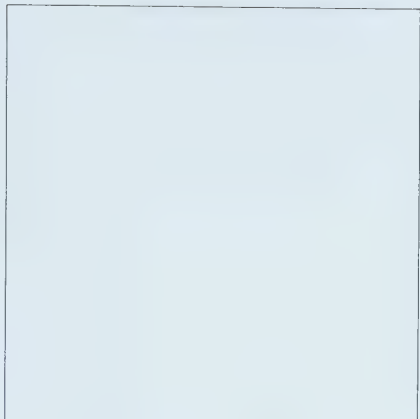


Because so many operations co-operate in the workings of the personal computer a different approach can be taken to the acts of writing text and headings, composing pictures, and composing pages. In these experimental examples rhetoric has been used as a means to gather verbal and visual information about a topic and to provide a means of selecting different images for composition into pages. Different images, of course, have different effects in different people. These examples are not intended for any specific groups of audiences, however, the more symbolic the images the more the signs are dependent on extrinsic sources for their meaning. Consequently the first examples in each group would more readily appeal to those already having a knowledge of the subject. The more descriptive images would have a more general appeal. Selecting different pictures to illustrate various aspects of the topic would obviously also give a different focus to the document.

The two groups of examples are provided as a comparison of two approaches to design. Group 5 is a departure from tradition in that no preliminary division of the space was made. The work is based on the principle that once the text is entered into the computer it can be broken into independent thought groups each of which can be visually treated in any way as to size of type, bold, italic, line lengths, black type, white type, etc. and be placed anywhere in the page.

Digitization allows for text and pictures to be combined easily. Using different software programs and output devices, it can readily yield varying degrees of iconicity in pictures and variety in typography. It creates a dynamic visual form in the document. And the pixels, by combining high and low resolution, give their own unique quality to the overall texture of the pages.

The freedom in composition afforded by new technology, while challenging the user to new ways of combining words and pictures in space, puts great demand on him or her in maintaining the integrity of the whole unit of expression. None of the constituent parts can be seen in isolation. The ambiguity of the form must be kept from becoming confusion. Ultimately the reader's mind must be able to put the various parts together into a cohesive whole. All elements must remain interactive and inter-penetrating while moving the eye across the juxtaposed objects and lifting information off the page into the mind of the reader. Using rhetoric as a means of analysing the communication situation allows for as much or as little information to be gathered about the communication situation (about both sender and receiver) as deemed necessary, which can provide a resource for making decisions in the synthesizing process concerning the capabilities of the readers to understand form. The combinations of different words and pictures will move different people differently.





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live.

CLIMATE
crisis ?

Dedicated to the wise use of the
earth's resources.

Are We Changing the World's Climate?

■ *Venice is only a memory. One-third of Florida is under water. Manhattan is swamped. Parts of Hong Kong have disappeared beneath the murky sea. Mid-continental North America is a desert. That's a frightening scenario, but some scientists are saying it could happen. The problem: the earth's climate is apparently warming up. Eventually, the Antarctic ice cap could melt, raising sea levels around the world, inundating coastal cities. Growing regions shift. When we burn oil, coal and other fossil fuels, carbon dioxide is produced. Some of it remains in the atmosphere where it traps heat from the earth. The situation is getting worse because we are burning more fossil fuels than ever before.*

Recently a number of the world's leading climate experts gathered at Boulder, Colorado, to put together what may be the longest-range weather forecast ever attempted. Their prediction isn't simply an academic exercise, however. It is in response to a growing threat which many of them say is altering the global environment in a way unprecedented in human history. By burning fossil fuels — coal, oil, and gas — man is gradually heating up the earth.

The experts are not sure exactly what the rate of warming is — or what the effects might be. But the impacts are potentially so sweeping that Gus Speth, former head of the President's Council on Environmental Quality (CEQ) in the United States, terms this problem "the ultimate environmental dilemma." The worst possible scenario is grim, indeed: by the middle of the next century, our planet could be warmer than at any time during the last 100,000 years. If that happened, entire growing zones, deserts, grasslands, and forests could all shift. Melting ice in the polar regions could raise sea levels 15 feet. The very pattern of life on our planet could be

■ *The use of fossil fuels (coal, gas and oil) has increased for more than a century, with dramatic hikes in consumption since 1940.*

■ *When fossil fuels are burned, a chemical reaction occurs: carbon in the fuel combines with oxygen to produce carbon dioxide (CO₂).*

■ *Shortwave radiation from the sun passes through the atmosphere to warm the earth's surface. It is not affected by the CO₂ buildup in the atmosphere.*

drastically altered. The cause of these potentially enormous changes in world climate involves an odorless, colourless gas called carbon dioxide (CO₂). A vital ingredient in photosynthesis — the process by which green plants grow and produce oxygen — it makes up less than .04 per cent of the atmosphere. But since the start of the Industrial Revolution in the late 1700's the amount of CO₂ in the air has increased by 15 to 25 per cent.

The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO₂. Around half the CO₂ generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, ever higher concentrations of the gas build up. Since 1957, when systematic monitoring of atmospheric CO₂ was started, levels have increased by 7 per cent.

This virtually transparent layer of gas has little effect on the sunlight which passes through it to warm the earth. But infrared heat radiated back into the atmosphere

re from the planet's surface has a longer wavelength and some of it is consequently trapped by the CO₂, in a process that has been called a "greenhouse effect."

How much has this accumulation actually warmed the world climate? "We apparently have affected the natural systems very much yet," says William Kellogg, a senior climatologist at the U.S. National Centre for Atmospheric Research. "The increase theoretically has been something on the order of one degree Fahrenheit. It's in the same ballpark as the natural fluctuations we've seen over the last 1000 years. When it gets near two degrees, then it'll dominate over the natural processes."

That's what scientists worry about. In the late 1970's, consumption of fossil fuels increased by about 2.5 per cent annually. If that rate continues, the CO₂ concentrations in the air will be double the pre-Industrial Revolution level by the middle of the next century. Such estimates come from computer models, and their projections frequently do not agree. But most scientists concur that a doubling could raise the earth's average tem-

er-wave infrared radiation
d from the earth is partially
bed by CO₂ in the atmos-
As levels increase, more
ion is trapped, raising the
s overall temperature. This is
greenhouse effect."

ure from nearly three to as
as eight degrees Fahren-
The increase would be least
tropics, somewhat greater
Antarctic and still greater
Arctic.

eduction in the temperature
ential between the tropics
ne polar regions would pro-
a weakening of the vast
engine which drives the
s weather — the flow of
air up from the equator to-
the poles and the counter-
f cold air down from the
toward the equator. At the
time, the surface waters of
ceans would become
er. Winds which circulate
n currents might diminish.
the oceans profoundly in-
ce weather patterns, future
ges in temperature, mixing
irculation would have a sig-
nt impact on the earth's cli-

of this could make the
drier and subtropical re-
wetter. However, says
Burns of the American As-
socation for the Advancement of
ce, "what the farmer wants
ow is whether it's going to
n July in Iowa." Research-
ave been trying, in a gen-
way, to answer such ques-

As higher temperatures melt the
west Antarctic ice sheet, sea levels
could rise 15 feet or more. Shore-
lands around the globe could be
inundated.

tions. They've not only taken
computer climate models into
account, but also studied much
warmer periods in the distant
past.

One projection, based on such
a study, shows the midwestern
United States, the Soviet Union
and northern China as drier, and
Europe, Australia, and north and
west Africa as wetter. On the ba-
sis of this and other scientific
projections, the rich midwest
corn and wheat belt of the United
States could become arid prai-
rie. But the more northern grow-
ing regions of the United States,
Canada, and Russia could
greatly benefit from a longer
growing season. Parched areas
such as north and west Africa —
including the Sahara — Mexico
and much of Australia might
again turn green. Stronger, more
regular monsoon rains could im-
prove growing conditions for the
nations of the Indian sub-conti-
nent. All told, hundreds of mil-
lions of people could be affected
— some for better, some for
worse.

Indeed, the whole range of po-
tential impacts from a world
warm-up is a combination of
pluses and minuses.

a) Insect pests, which already

Rainfall patterns could change.
Both increased precipitation and
evaporation might result. Decreased
rainfall might occur over northern
China, the U.S.S.R. and the U.S.A.
midwest, with increases in Africa
and Europe.

destroy more than 35 per cent of
the world's crops, would likely
multiply in a warmer global cli-
mate. Crop diseases could also
become more of a threat.

b) Increased carbon dioxide in
the air, which can enhance pho-
tosynthesis, could lessen the re-
quirements for water and boost
the yields of some crops.

c) The intricate balance of
natural ecosystems could be up-
set. For the most part, wildlife
would migrate with the climate,
and survive. But species that live
in specialized habitats might be-
come extinct. Boundaries of
some reserves and parks set up
to save endangered species
could become meaningless as
rainfall and vegetation changes.

d) Changes in ocean circula-
tion and temperatures could hurt
fisheries by disrupting the
"upwelling" process which brings
nutrients up from the depths.

e) The west Antarctic ice sheet
could eventually melt. As a re-
sult, coastal areas throughout
the world would be inundated.
One study estimates that about
12 million North Americans
would be uprooted, including
more than 40 per cent of
Florida's population.

All of this may come to pass —

Climate zones in every continent would shift, changing food-growing patterns. In both hemispheres farming would extend further toward the poles, with losses for some crops and gains for others.

Ecosystems, made up of plants and animals that interact within a natural balance, would be disrupted. As arable land turns to desert, and dry land turns green, some species, unable to adapt, would face extinction.

And people? Some nations might benefit, but elsewhere changes in land use, ownership and settlement (as well as the availability of water) could put severe strains on societies, producing widespread political upheaval.

drastically changing the world as we know it today. But scientists are the first to concede the uncertainties. Take the various computer climate simulations, for example. These models are oversimplifications of extremely complex and imperfectly understood geophysical systems. The dynamics of oceans — their heat transport, currents and interactions with the atmosphere — are unclear, for instance. Add in other effects, such as the interrelationships of land masses, snow and ice, vegetation and wind circulation, and the task of simulating future climate becomes complex indeed.

Just as perplexing is the question of how long it will take for the atmospheric concentrations of CO₂ to double from the nineteenth century levels. That depends, in a large part, on the future growth and nature of world energy consumption. From 1940 to 1970, the use of fossil fuels grew at a four per cent annual rate. But soaring fuel prices have dampened demand and lowered that rate to the present 2.5 per cent.

Projections of future energy growth hinge on all sorts of assumptions — development in

emerging nations, population increases, price effects, etc. Recessions, wars (especially nuclear), embargoes and other unpredictable events could alter the forecasts. So could the future patterns of fuel use. For instance, natural gas throws off about 40 per cent less CO₂ per unit of energy than coal, and synthetic fuels emit about one third more. Thus, Soviet plans to tap enormous Siberian gas resources or the development of massive U. S. synfuels industry could affect CO₂ buildup.

There is also the problem of detecting the global warm-up caused by the "greenhouse effect," or, as scientists put it, "separating the signal from the noise." The "noise" is the normal natural fluctuations of the world climate. The "signal" is the CO₂-induced warming. The difficulties are compounded by the probable "lag effect" of the oceans. The oceans could soak up enough excess heat to delay detection of any abnormal warming trend by several decades.

While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the vexing questions, the immediate di-

lemma is what to do and when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels — through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. Such policies, however, would have to be global. Indeed, they'd require a unique kind of international cooperation.

Another way of attacking the problem is to prepare for a warmer world. That could mean developing drought-resistant crops and new strains that would stand up to higher temperatures and utilize saltier water. It could mean improved irrigation and water management techniques and better ways of protecting arable soil. It could require global food reserves and plans for massive disaster relief.

How long does the world have to act? Many scientists agree with National Oceanic and Atmospheric Administration climatologist Lester Machta that we have another 10 to 15 years. "The uncertainties are too large," he feels, "to say that some kind of positive actions have to be taken right now." Some agree

former CEQ chairman Gus
that the world can't wait
the uncertainties are nar-
d before moving.
far though, scientists have
d a lot more concern than
makers. Indeed, the inter-
al scientific community is
izing to investigate the
house effect." In 1980, the
Meteorological Organiza-
unched a Climate Impact
es Program. And the United
ns Environment Program
rganized a Global Environ-
al Monitoring System which
essing global atmospheric
on and its impact on cli-

problem, notes climatolo-
William Kellogg, is that the
ess of climate change is a
ne. And the democratic
n isn't very good at taking
ange problems into ac-
" But sooner or later, the
may have little choice. As
Burns put it, "we are tak-
e thin film of air and water
which life on earth de-
and messing around with
absolutely fundamental
-without really knowing
nsequences of what we're

Other activities affecting our climate are forest cutting, pollutants, and nature itself.

The breakneck harvesting of the worlds tropical forests could increase the amount of CO2 in the air since trees use vast amounts of the gas in the process of photosynthesis.

In addition to CO2 we are pumping millions of tons of other gases into what some scientists sardonically call the "sewer in the sky:" nitrous oxide, sulphur dioxide, ozone, carbon monoxide, chlo-rofluormethanes and meth-ane. Besides other harmful effects, these gasses also absorb infrared heat radiation.

A slow change in the tilt of the earth's axis slightly alters the angle at which it orbits the sun, influencing the amount of solar radiation received. Also, the quantity of radiation heat from the sun is not constant but flucuates. Some scientists believe this combintation has been a cause of the cycles of ice ages and warm climates on the earth.

Is there a solution?

People can plan on two fronts:

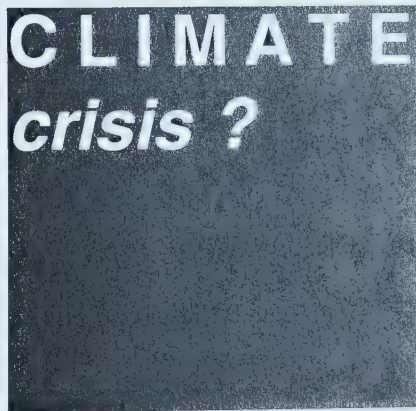
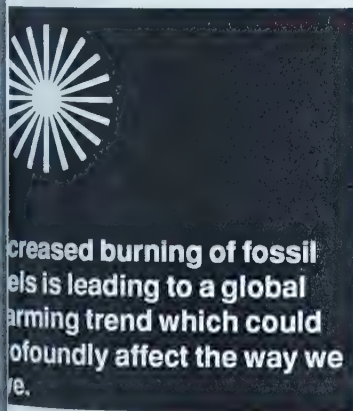
1. Co-operate globally for long-range energy planning by stressing conservation and greater reliance on hydro, solar and other nonfossil energy sources.
2. Prepare for a warmer earth by developing drought-resistant crops, establishing a world food bank and improving water management.





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earth's resources.

Are We Changing the World's Climate?



Venice is only a memory. One-third of Florida is under water. Manhattan is swamped. Parts of Hong Kong have disappeared beneath the murky sea. Mid-continental North America is a desert. That's a frightening scenario, but some scientists are saying it could happen. The problem: the earth's climate is apparently warming up. Eventually, the Antarctic ice cap could melt, raising sea levels around the world, inundating coastal cities. Growing regions shift. When we burn oil, coal and other fossil fuels, carbon dioxide is produced. Some of it remains in the atmosphere where it traps heat from the earth. The situation is getting worse because we are burning more fossil fuels than ever before.

Recently a number of the world's leading climate experts gathered at Boulder, Colorado, to put together what may be the longest-range weather forecast ever attempted. Their prediction isn't simply an academic exercise, however. It is in response to a growing threat which many of them say is altering the global environment in a way unprecedented in human history. By burning fossil fuels — coal, oil, and gas — man is gradually heating up the earth.

The experts are not sure exactly what the rate of warming is — or what the effects might be. But the impacts are potentially so sweeping that Gus Speth, former head of the President's Council on Environmental Quality (CEQ) in the United States, terms this problem "the ultimate environmental dilemma." The worst possible scenario is grim, indeed: by the middle of the next century, our planet could be warmer than at any time during the last 100,000 years. If that happened, entire growing zones, deserts, grasslands, and forests could all shift. Melting ice in the polar regions could raise sea levels 15 feet. The very pattern of life on our planet could be

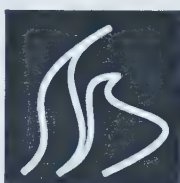
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The use of fossil fuels (coal, gas and oil) has increased for more than a century, with dramatic hikes in consumption since 1940.



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When fossil fuels are burned, a chemical reaction occurs: carbon in the fuel combines with oxygen to produce carbon dioxide (CO₂).



drastically altered. The cause of these potentially enormous changes in world climate involves an odorless, colourless gas called carbon dioxide (CO₂). A vital ingredient in photosynthesis — the process by which green plants grow and produce oxygen — it makes up less than .04 per cent of the atmosphere. But since the start of the Industrial Revolution in the late 1700's the amount of CO₂ in the air has increased by 15 to 25 per cent.

The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO₂. Around half the CO₂ generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, ever higher concentrations of the gas build up. Since 1957, when systematic monitoring of atmospheric CO₂ was started, levels have increased by 7 per cent.

This virtually transparent layer of gas has little effect on the sunlight which passes through it to warm the earth. But infrared heat radiated back into the atmosphere

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Shortwave radiation from the sun passes through the atmosphere to warm the earth's surface. It is not affected by the CO₂ buildup in the atmosphere.



re from the planet's surface has a longer wavelength and some of it is consequently trapped by the CO₂, in a process that has been called a "greenhouse effect."

How much has this accumulation actually warmed the world climate? "We apparently have not affected the natural systems very much yet," says William R. Kellogg, a senior climatologist at the U.S. National Centre for Atmospheric Research. "The increase theoretically has been something on the order of one degree Fahrenheit. It's in the same ballpark as the natural fluctuations we've seen over the last 1000 years. When it gets near two degrees, then it'll dominate over the natural processes."

That's what scientists worry about. In the late 1970's, consumption of fossil fuels increased by about 2.5 per cent annually. If that rate continues, the CO₂ concentrations in the air could be double the pre-Industrial Revolution level by the middle of the next century. Such estimates come from computer models, and their projections frequently do not agree. But most scientists concur that a doubling could raise the earth's average temperature

long-wave infrared radiation from the earth is partially absorbed by CO₂ in the atmosphere. As levels increase, more heat is trapped, raising the overall temperature.



temperatures from nearly three to as high as eight degrees Fahrenheit. The increase would be least in the tropics, somewhat greater in the Antarctic and still greater in the Arctic.

Reduction in the temperature differential between the tropics and the polar regions would produce a weakening of the vast convection engine which drives the earth's weather — the flow of warm air up from the equator to the poles and the counterflow of cold air down from the poles toward the equator. At the same time, the surface waters of the oceans would become warmer.

Winds which circulate in ocean currents might diminish. Changes in the oceans profoundly influence weather patterns, future changes in temperature, mixing and circulation would have a significant impact on the earth's climate.

Any of this could make the world drier and subtropical regions wetter. However, says Dr. James H. Burnes of the American Association for the Advancement of Science, "what the farmer wants to know is whether it's going to be a wet July in Iowa." Researchers have been trying, in a general way, to answer such ques-

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As higher temperatures melt the west Antarctic ice sheet, sea levels could rise 15 feet or more. Shorelands around the globe could be inundated.



tions. They've not only taken computer climate models into account, but also studied much warmer periods in the distant past.

One projection, based on such a study, shows the midwestern United States, the Soviet Union and northern China as drier, and Europe, Australia, and north and west Africa as wetter. On the basis of this and other scientific projections, the rich midwest corn and wheat belt of the United States could become arid prairie. But the more northern growing regions of the United States, Canada, and Russia could greatly benefit from a longer growing season. Parched areas such as north and west Africa — including the Sahara — Mexico and much of Australia might again turn green. Stronger, more regular monsoon rains could improve growing conditions for the nations of the Indian subcontinent. All told, hundreds of millions of people could be affected — some for better, some for worse.

Indeed, the whole range of potential impacts from a world warm-up is a combination of pluses and minuses.

a) Insect pests, which already

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Rainfall patterns could change. Both increased precipitation and evaporation might result. Decreased rainfall might occur over northern China, the U.S.S.R. and the U.S.A. midwest, with increases in Africa and Europe.



destroy more than 35 per cent of the world's crops, would likely multiply in a warmer global climate. Crop diseases could also become more of a threat.

b) Increased carbon dioxide in the air, which can enhance photosynthesis, could lessen the requirements for water and boost the yields of some crops.

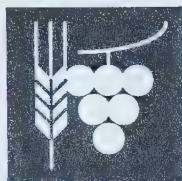
c) The intricate balance of natural ecosystems could be upset. For the most part, wildlife would migrate with the climate, and survive. But species that live in specialized habitats might become extinct. Boundaries of some reserves and parks set up to save endangered species could become meaningless as rainfall and vegetation changes.

d) Changes in ocean circulation and temperatures could hurt fisheries by disrupting the "upwelling" process which brings nutrients up from the depths.

e) The west Antarctic ice sheet could eventually melt. As a result, coastal areas throughout the world would be inundated. One study estimates that about 12 million North Americans would be uprooted, including more than 40 per cent of Florida's population.

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Climate zones in every continent would shift, changing food-growing patterns. In both hemispheres farming would extend further toward the poles, with losses for some crops and gains for others.



All of this may come to pass — drastically changing the world as we know it today. But scientists are the first to concede the uncertainties. Take the various computer climate simulations, for example. These models are oversimplifications of extremely complex and imperfectly understood geophysical systems. The dynamics of oceans — their heat transport, currents and interactions with the atmosphere — are unclear, for instance. Add in other effects, such as the interrelationships of land masses, snow and ice, vegetation and wind circulation, and the task of simulating future climate becomes complex indeed.

Just as perplexing is the question of how long it will take for the atmospheric concentrations of CO₂ to double from the nineteenth century levels. That depends, in a large part, on the future growth and nature of world energy consumption. From 1940 to 1970, the use of fossil fuels grew at a four per cent annual rate. But soaring fuel prices have dampened demand and lowered that rate to the present 2.5 per cent.

Projections of future energy growth hinge on all sorts of as-

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Ecosystems, made up of plants and animals that interact within a natural balance, would be disrupted. As arable land turns to desert, and dry land turns green, some species, unable to adapt, would face extinction.



sumptions — development in emerging nations, population increases, price effects, etc. Recessions, wars (especially nuclear), embargoes and other unpredictable events could alter the forecasts. So could the future patterns of fuel use. For instance, natural gas throws off about 40 per cent less CO₂ per unit of energy than coal, and synthetic fuels emit about one third more. Thus, Soviet plans to tap enormous Siberian gas resources or the development of massive U. S. synfuels industry could affect CO₂ buildup.

There is also the problem of detecting the global warm-up caused by the "greenhouse effect," or, as scientists put it, "separating the signal from the noise." The "noise" is the normal natural fluctuations of the world climate. The "signal" is the CO₂-induced warming. The difficulties are compounded by the probable "lag effect" of the oceans. The oceans could soak up enough excess heat to delay detection of any abnormal warming trend by several decades.

While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the

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And people? Some nations might benefit, but elsewhere changes in land use, ownership and settlement (as well as the availability of water) could put severe strains on societies producing widespread political upheaval.



vexing questions, the immediate dilemma is what to do and when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels — through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. Such policies, however, would have to be global. Indeed, they'd require a unique kind of international cooperation.

Another way of attacking the problem is to prepare for a warmer world. That could mean developing drought-resistant crops and new strains that would stand up to higher temperatures and utilize saltier water. It could mean improved irrigation and water management techniques and better ways of protecting arable soil. It could require global food reserves and plans for massive disaster relief.

How long does the world have to act? Many scientists agree with National Oceanic and Atmospheric Administration climatologist Lester Machta that we have another 10 to 15 years. "The uncertainties are too large," he feels, "to say that some kind of positive actions have to be

right now." Some agree former CEQ chairman Gus that the world can't wait the uncertainties are narrow before moving. far though, scientists have a lot more concern than makers. Indeed, the international scientific community is trying to investigate the "greenhouse effect." In 1980, the World Meteorological Organization launched a Climate Impact Assessment Program. And the United Nations Environment Program organized a Global Environmental Monitoring System which assesses global atmospheric pollution and its impact on climate.

The problem, notes climatologist William Kellogg, is that the science of climate change is a work in progress. And the democratic process isn't very good at taking long-range problems into account. "But sooner or later, the world may have little choice. As James Hansen put it, "we are taking a thin film of air and water which life on earth depends on and messing around with it in an absolutely fundamental way — without really knowing the consequences of what we're doing."

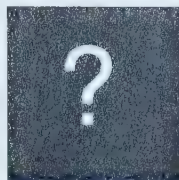
Other activities affecting our climate are forest cutting, pollutants, and nature itself.

The breakneck harvesting of the world's tropical forests could increase the amount of CO₂ in the air since trees use vast amounts of the gas in the process of photosynthesis.

In addition to CO₂ we are pumping millions of tons of other gases into what some scientists sardonically call the "sewer in the sky:" nitrous oxide, sulphur dioxide, ozone, carbon monoxide, chlorofluoromethanes and methane. Besides other harmful effects, these gasses also absorb infrared heat radiation.

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Is there a solution?



People can plan on two fronts:

1. Co-operate globally for long-range energy planning by stressing conservation and greater reliance on hydro, solar and other nonfossil energy sources.
2. Prepare for a warmer earth by developing drought-resistant crops, establishing a world food bank and improving water management.



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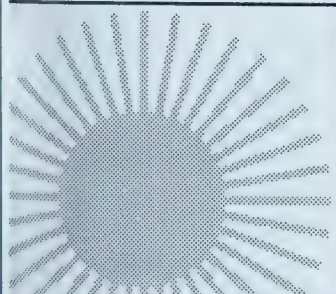


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of the earth's resources

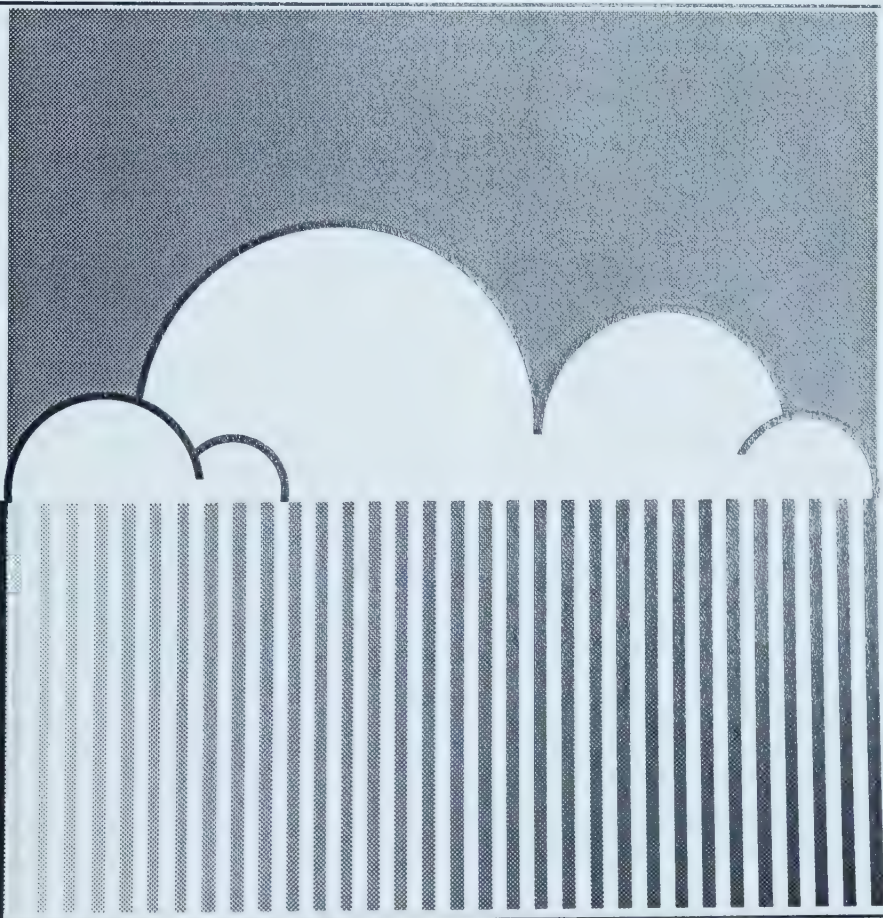
CLIMATE *crisis* ?



Increased burning of
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Sam Iker



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tury, our planet could be warmer than at any time during the last 100,000 years. If that happened, entire growing zones, deserts, grasslands, and forests could all shift. Melting ice in the polar regions could raise sea levels 15 feet. The very pattern of life on our planet could be drastically altered. The cause of these potentially enormous changes in world climate involves an odorless, colourless gas called carbon dioxide (CO₂). A vital ingredient in photosynthesis — the process by which green plants grow and produce oxygen — it makes up less than .04 per cent of the atmosphere. But since the start of the Industrial Revolution in the late 1700's the amount of CO₂ in the air has increased by 15 to 25 per cent.

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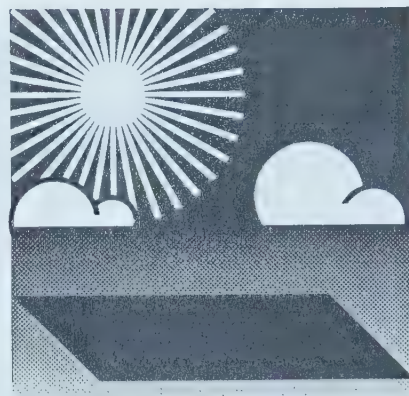
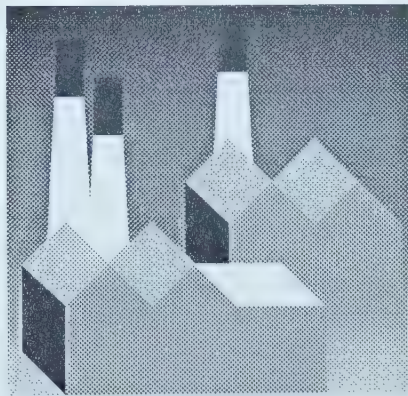
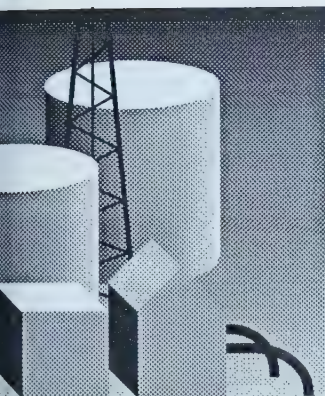
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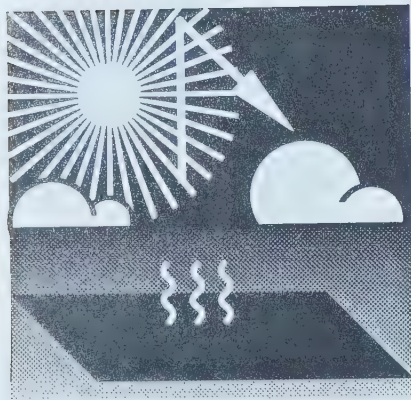
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However, says David Burns of the American Association for the Advancement of Science, "what the farmer wants to know is whether it's going to rain in July in Iowa." Researchers have been trying, in a general way, to answer such questions. They've not only taken computer climate models into account, but also studied much warmer periods in the distant past.

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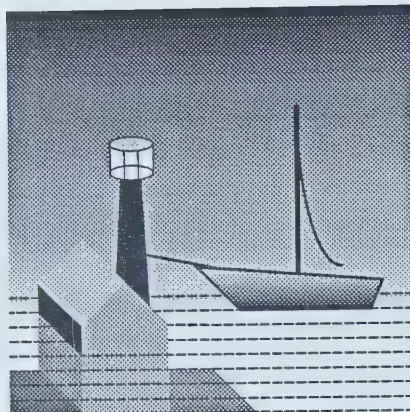
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a) Insect pests, which already destroy more than 35 per cent of the world's crops, would likely multiply in a warmer global climate. Crop diseases could also become more of a threat.

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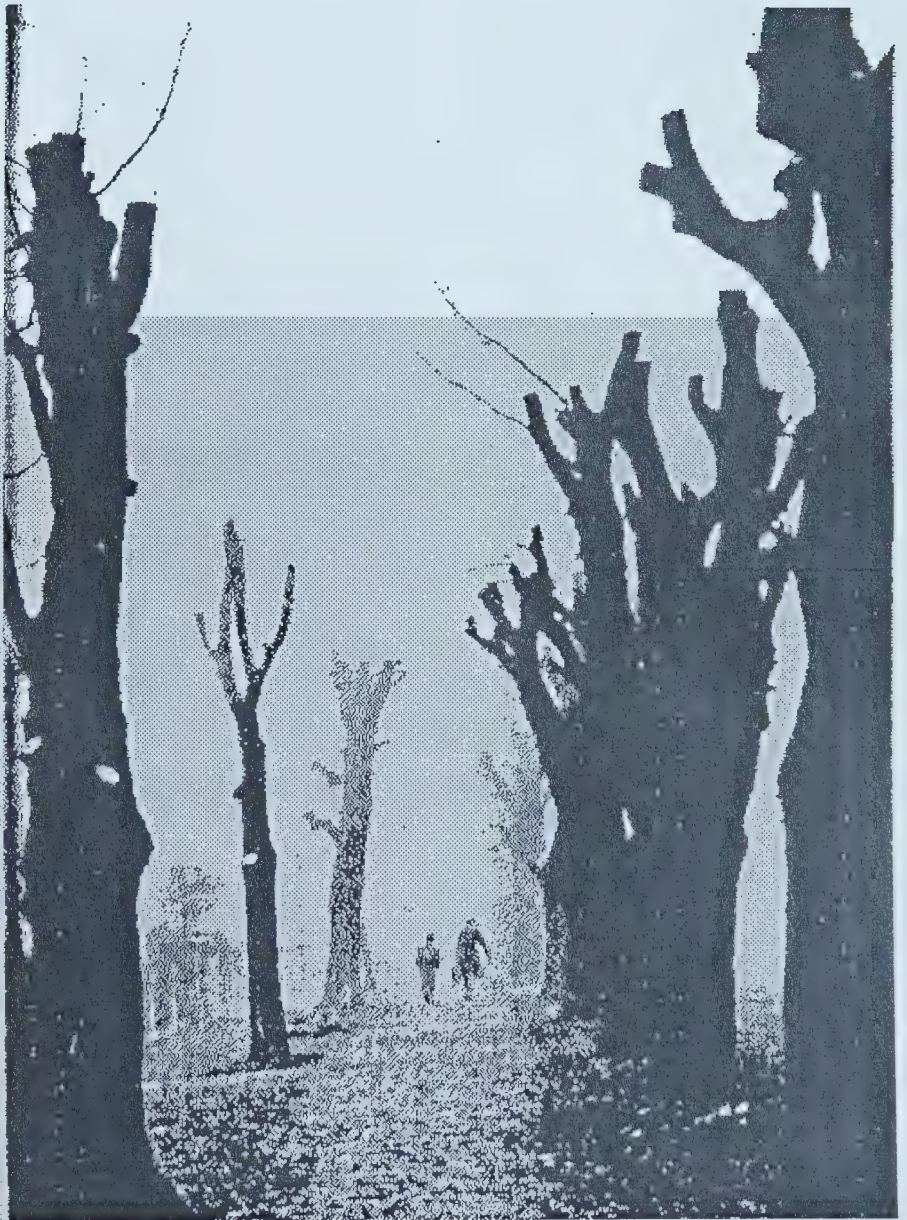
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*This could become a familiar sight
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Other activities affecting our climate

Forest cutting

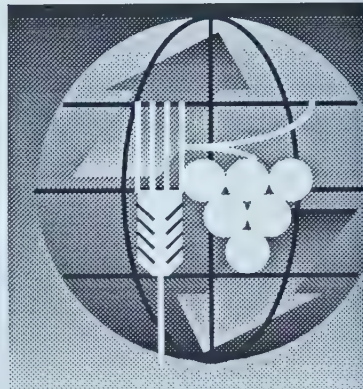
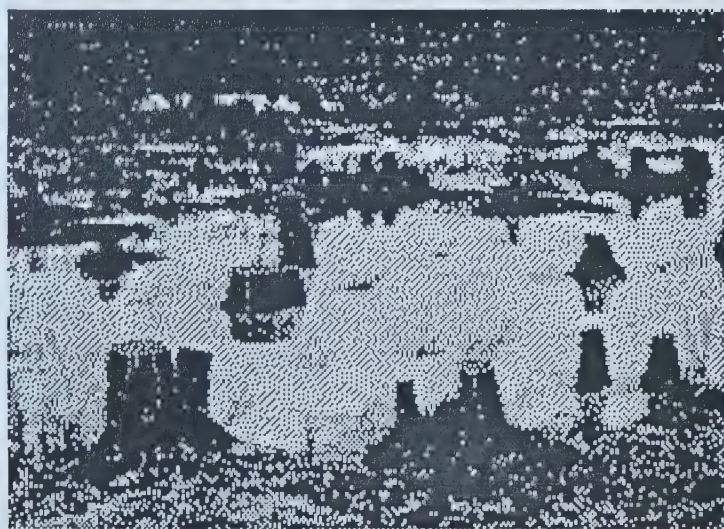
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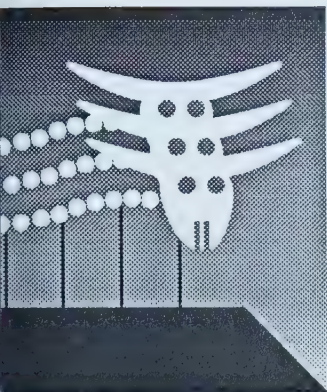
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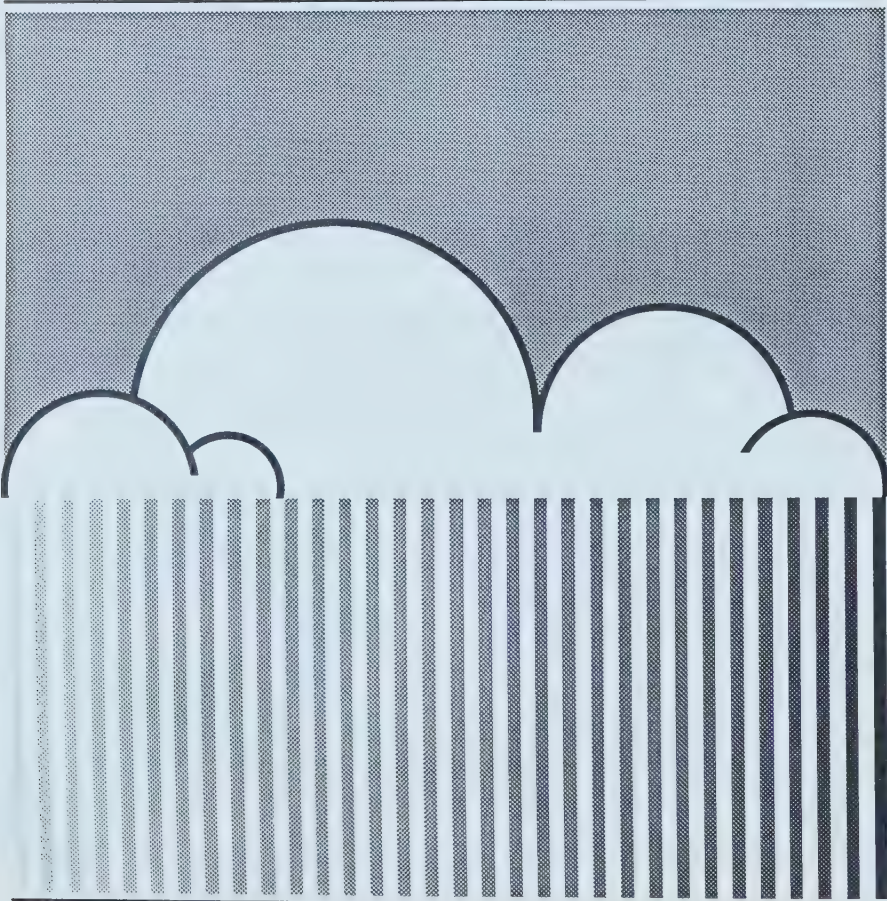
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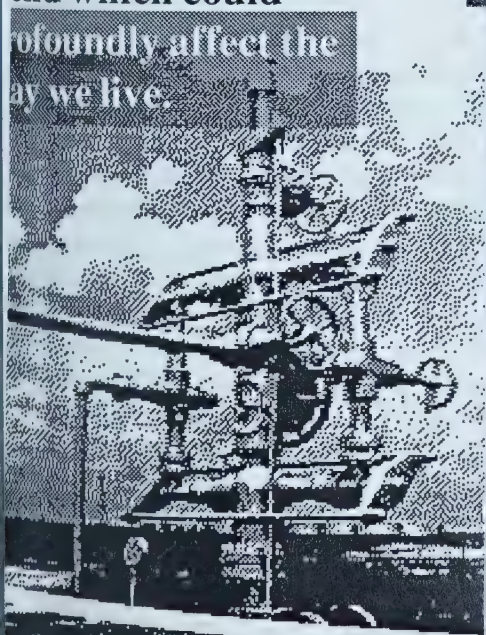
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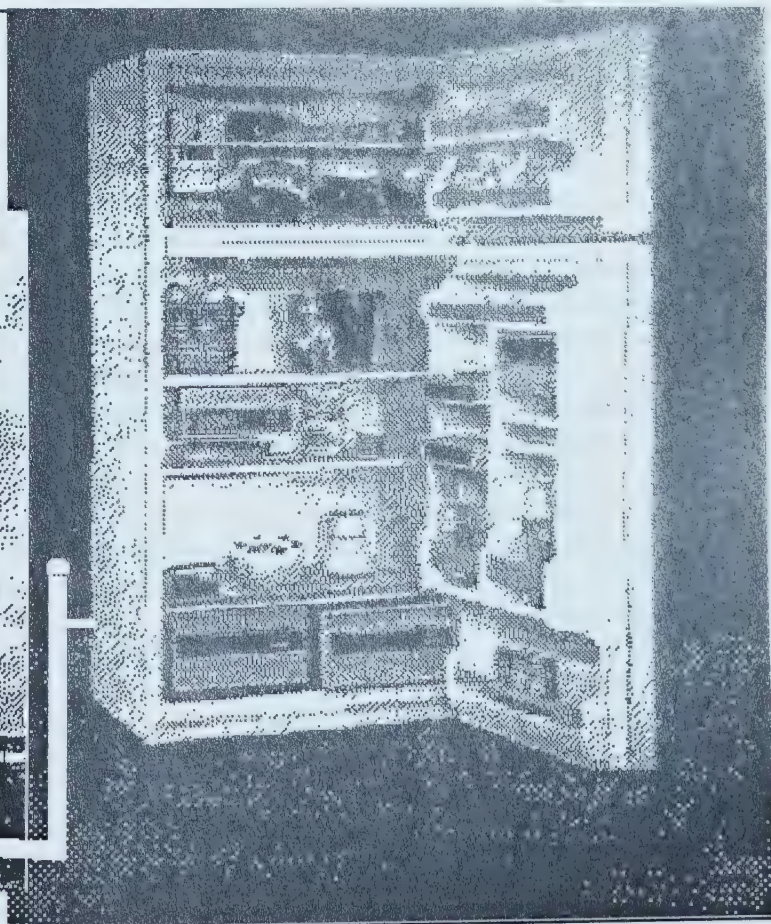
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Are We Changing the World's Climate ?

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Recently a number of the world's leading climate experts gathered at Boulder, Colorado, to put together what may be the longest-range weather forecast ever attempted. Their prediction isn't simply an academic exercise, however. It is in response to a growing threat which many of them say is altering the global environment in a way unprecedented in human history. By burning fossil fuels — coal, oil, and gas — man is gradually heating up the earth.

The experts are not sure exactly what the rate of warming is — or what the effects might be. But the impacts are potentially so sweeping that Gus Speth, former head of the President's Council on Environmental Quality (CEQ) in the United States, terms this problem "the ultimate environmental dilemma." The worst possible scenario is grim, indeed: by the middle of the next cen-

tury, our planet could be warmer than at any time during the last 100,000 years. If that happened, entire growing zones, deserts, grasslands, and forests could all shift. Melting ice in the polar regions could raise sea levels 15 feet. The very pattern of life on our planet could be drastically altered. The cause of these potentially enormous changes in world climate involves an odorless, colourless gas called carbon dioxide (CO₂). A vital ingredient in photosynthesis — the process by which green plants grow and produce oxygen — it makes up less than .04 per cent of the atmosphere. But since the start of the Industrial Revolution in the late 1700's the amount of CO₂ in the air has increased by 15 to 25 per cent.

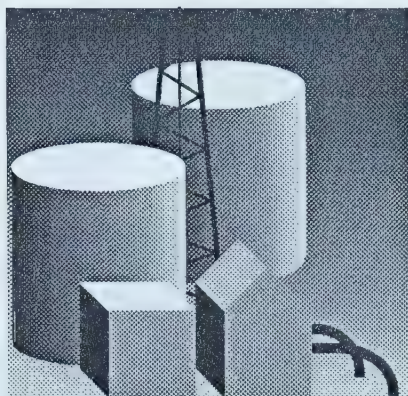
The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO₂. Around half the CO₂ generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, even higher concentrations of the gas build up. Since 1957, when systematic monitoring of atmospheric CO₂ was started, levels have increased by 7 per cent.

This virtually transparent layer of gas has little effect on the sunlight which passes through it to warm the earth. But infrared heat radiated back into the atmosphere from the planet's surface has a longer wavelength and some of it is consequently trapped by the CO₂, in a process that has been called a "greenhouse effect."

The use of fossil fuels (coal, gas and oil) has increased for more than a century, with dramatic hikes in consumption since 1940.

When fossil fuels are burned, a chemical reaction occurs: carbon in the fuel combines with oxygen to produce carbon dioxide (CO₂).

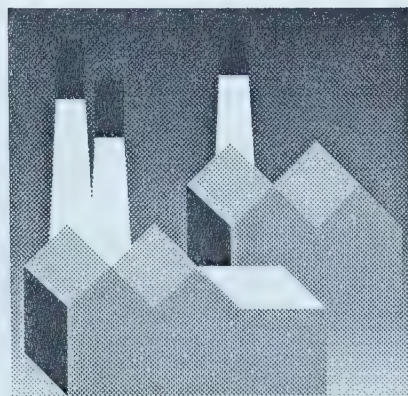
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A reduction in the temperature differential between the tropics and the polar regions would produce a weakening of the vast heat engine which drives the world's weather — the flow of warm air up from the equator toward the poles and the counterflow of cold air down from the poles toward the equator. At the same time, the surface waters of the oceans would become warmer. Winds which circulate ocean currents might diminish. Since the oceans profoundly influence weather patterns, future changes in temperature, mixing and circulation would have a significant impact on the earth's climate.

All of this could make the poles drier and subtropical regions wetter. However, says David Burns of the American Association for the Advancement of Science, "what the farmer wants to know is whether it's going to rain in July in Iowa." Re-

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searchers have been trying, in a general way, to answer such questions. They've not only taken computer climate models into account, but also studied much warmer periods in the distant past.

One projection, based on such a study, shows the midwestern United States, the Soviet Union and northern China as drier, and Europe, Australia, and north and west Africa as wetter. On the basis of this and other scientific projections, the rich mid-west corn and wheat belt of the United States could become arid prairie. But the more northern growing regions of the United States, Canada, and Russia could greatly benefit from a longer growing season. Parched areas such as north and

much has this accumulation warmed the world's climate. "We apparently haven't affected the natural systems very much yet," says William Kellogg, a climatologist at the U.S. National Centre for Atmospheric Research. "The increase theoretically is something on the order of one degree Fahrenheit. It's in the ballpark as the natural fluctuations we've seen over the last 1000 years. When it gets near two degrees, then it'll dominate over the natural processes."

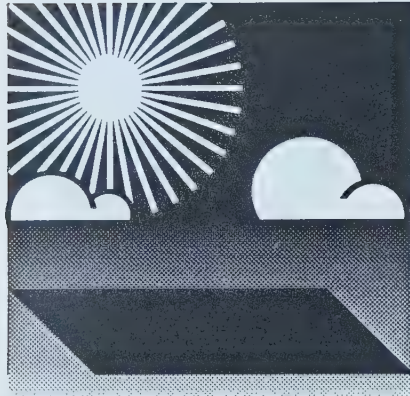
That's what scientists worry about. In the late 1970's, consumption of fossil fuels increased by 2.5 per cent annually. If that continues, the CO₂ concentration in the air will be double the pre-Industrial Revolution level by the middle of the next century. Such projections come from computer models, and their projections frequently do not agree. But most scientists concur that a doubling could raise the earth's average temperature from nearly three to as many as five degrees Fahrenheit. The increase would be least in the tropics, and greatest in the Antarctic and greatest in the Arctic.

Shortwave radiation from the sun passes through the atmosphere to warm the earth's surface. It is not affected by the CO₂ buildup in the atmosphere.

Longer-wave infrared radiation emitted from the earth is partially absorbed by CO₂ in the atmosphere. As levels increase, more radiation is trapped, raising the earth's overall temperature.

As higher temperatures melt the Antarctic ice sheet, sea levels could rise 15 feet or more. Shorelands around the globe could be inundated.

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west Africa — including the Sahara — Mexico and much of Australia might again turn green. Stronger, more regular monsoon rains could improve growing conditions for the nations of the Indian sub-continent. All told, hundreds of millions of people could be affected — some for better, some for worse.

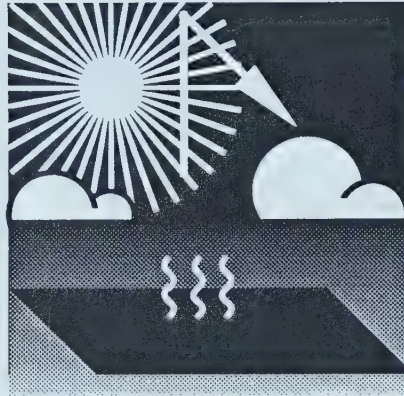
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a) Insect pests, which already destroy more than 35 per cent of the world's crops, would likely multiply in a warmer global climate. Crop diseases could also become more of a threat.

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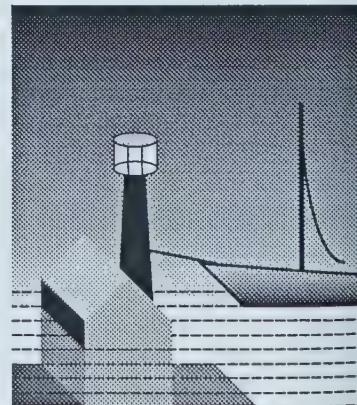
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e) The west Antarctic ice sheet could eventually melt. As a result, coastal areas throughout the world would be inundated. One study estimates that about 12 million North Americans would be uprooted, including more than 40 per cent of Florida's population.

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All of this may come to pass, drastically changing the world as we know it today. But scientists were the first to concede the uncertainties. Take the various computer model simulations, for example. These models are oversimplifications of extremely complex and perfectly understood geophysical systems. The dynamics of oceanic heat transport, currents and their interactions with the atmosphere are unclear, for instance. Add in other effects, such as the interrelationships of land masses, snow, ice, vegetation and wind circulation, and the task of simulating future climate becomes complex indeed.

Just as perplexing is the question of how long it will take for the atmospheric concentrations of CO₂ to double from the nineteenth century levels. That depends, in a large measure, on the future growth and nature of world energy consumption. From 1940 to 1970, the use of fossil



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*This could become a familiar sight
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many areas of the world, as grow-
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Other activities affecting our climate

Forest cutting

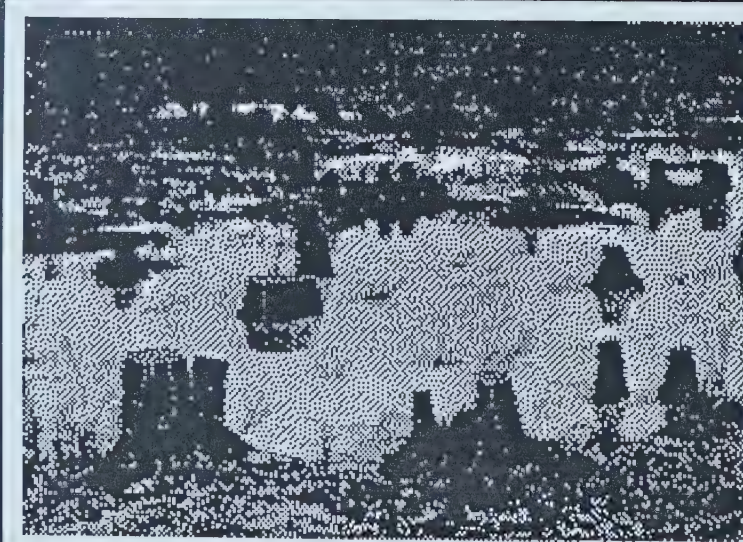
The breakneck harvesting of the world's tropical forests could increase the amount of CO₂ in the air since trees use vast amounts of the gas in the process of photosynthesis.

Pollutants

In addition to CO₂ we are pumping millions of tons of other gasses into what some scientists sardonically call the "sewer in the sky:" nitrous oxide, sulphur dioxide, ozone, carbon monoxide, chlorofluoromethanes and methane. Besides other harmful effects, these gasses also absorb infrared heat radiation.

Nature

A slow change in the tilt of the earth's axis slightly alters the angle at which it orbits the sun, influencing the amount of solar radiation received. Also, the quantity of radiation heat from the sun is not constant but fluctuates. Some scientists believe this combination has been a cause of the cycles of ice ages and warm climates on the earth.



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While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the vexing questions, the immediate dilemma is what to do and when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels — through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. Such policies, however, would have to be global. Indeed, they'd require a unique kind of international co-operation.

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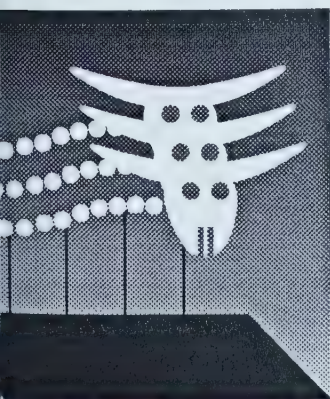


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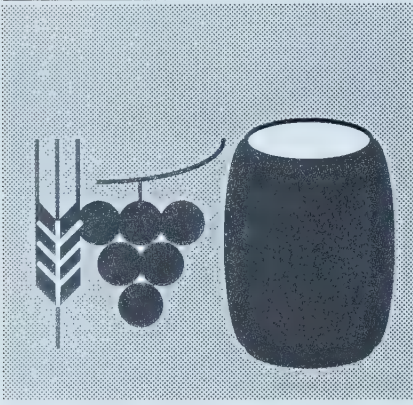
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People can plan on two fronts:

- 1. Co-operate globally for long-range energy planning by stressing conservation and greater reliance on hydro, solar and other nonfossil energy sources.*
- 2. Prepare for a warmer earth by developing drought-resistant crops, establishing a world food bank and improving water management.*



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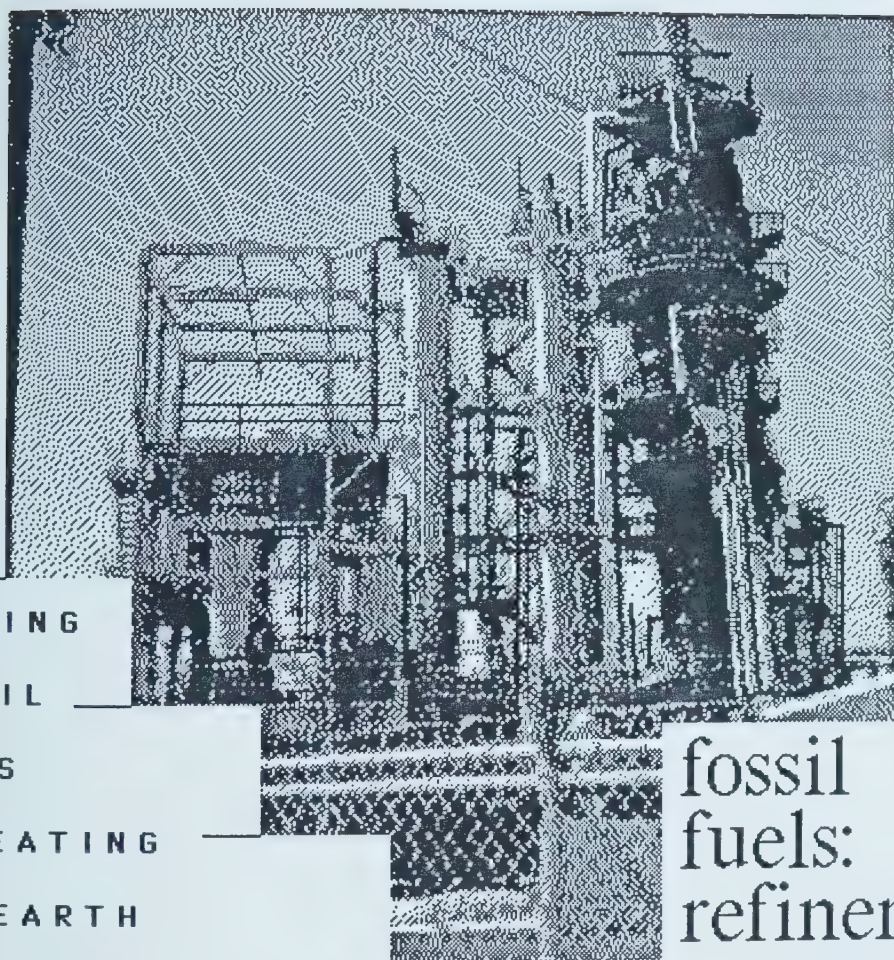
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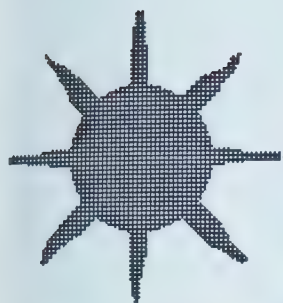
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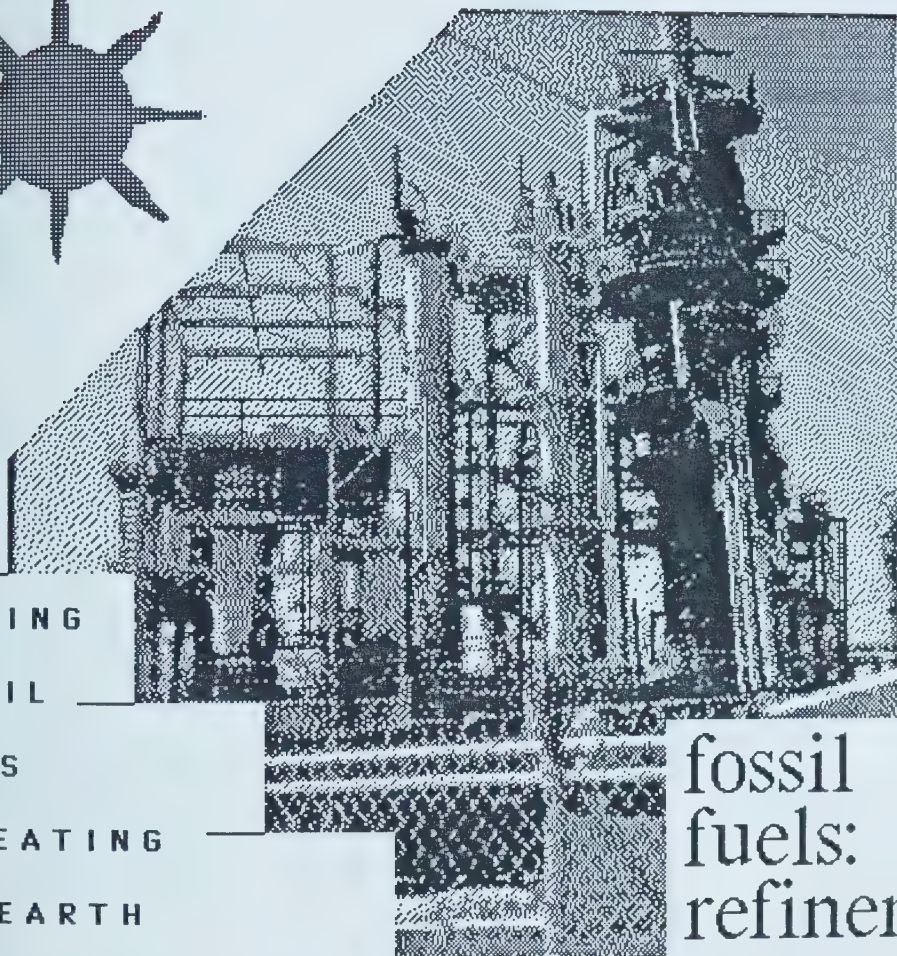
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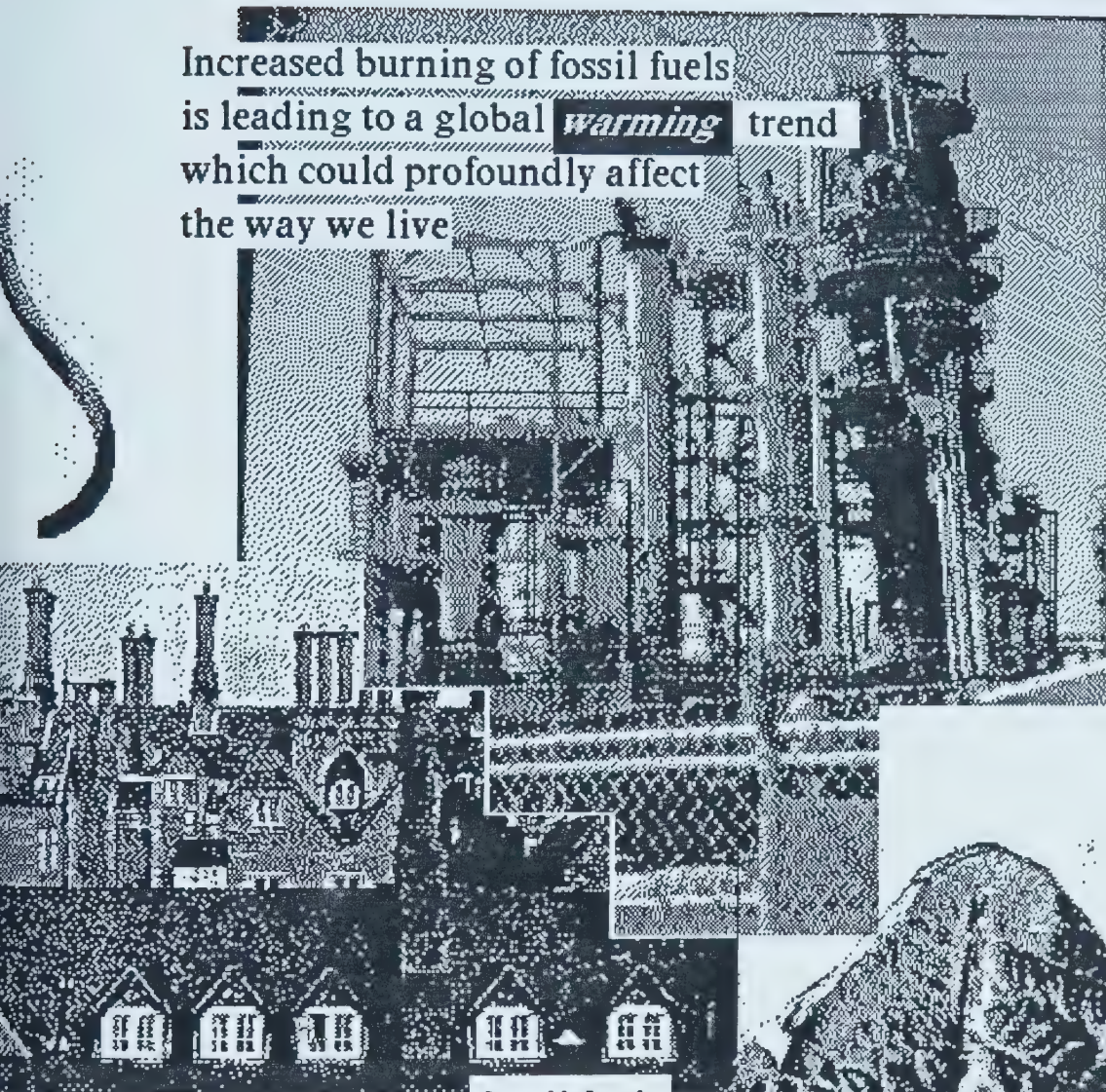


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fossil fuels

PLATES
Group 5

Environment Report 1987

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National Wildlife Federation
16th Street NW
Washington, DC
20036

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The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO₂. Around half the CO₂ generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, ever higher concentrations of the gas build up. Since 1957, when systematic monitoring of atmospheric CO₂ was started, levels have increased by 7 per cent.

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A reduction in the temperature difference between the tropics and the polar regions would produce a weakening of the vast heat engine which drives the world's weather — the flow of warm air up from the equator toward the poles and the counterflow of cold air down from the poles toward the equator. At the same time, the surface waters of the oceans would become

How much has this accumulation actually warmed the world's climate? "We apparently haven't affected the natural systems very much yet," says William Kellogg, a senior climatologist at the U.S. National Centre for Atmospheric Research. "The increase theoretically has been something on the order of one degree Fahrenheit. It's in the same ballpark as the natural fluctuations we've seen over the last 1000 years. When it gets near two degrees, then it'll dominate over the natural processes."

That's what scientists worry about. In the late 1970's, consumption of fossil fuels increased by about 2.5 per cent annually. If that rate continues, the CO₂ concentrations in the air will be double the pre-Industrial Revolution level by the middle of the next century. Such estimates come from computer models, and their projections

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As higher temperatures melt the west Antarctic ice sheet, sea levels could rise 15 feet or more. Shorelands around the globe could be inundated.

All of this could make the poles drier, subtropical regions wetter. However, David Burns of the American Association for the Advancement of Science, "what we want to know is whether it's going to be like July in Iowa." Researchers have been trying, in a general way, to answer such questions. They've not only taken computer models into account, but also studied warmer periods in the distant past.

Rainfall patterns could change. Both increased precipitation and evaporation might result. Decreased rainfall might occur over northern China, the U.S.S.R. and the U.S.A. midwest, with increases in Africa and Europe.

One projection, based on such a study, is that the midwestern United States, the Soviet Union, and northern China as drier, and Europe, Japan, and north and west Africa as wetter. On the basis of this and other scientific projections, the rich midwest corn and wheat belt of the United States could become arid prairie. But the northern growing regions of the United States, Canada, and Russia could greatly benefit from a longer growing season. Parched areas in north and west Africa — including the Sahel — Mexico and much of Australia might turn green. Stronger, more regular monsoons could improve growing conditions for millions of the Indian sub-continent. All told, hundreds of millions of people could be affected, some for better, some for worse.

Indeed, the whole range of potential impacts from a world warm-up is a combination of pluses and minuses.

a) Insect pests, which already destroy more than 35 per cent of the world's crops, would multiply in a warmer global climate. Crop diseases could also become more of a threat.

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Just as perplexing is the question of how long it will take for the atmospheric concentrations of CO₂ to double from the nineteenth century levels. That depends in a large part, on the future growth and natural world energy consumption. From 1940 to 1970 the use of fossil fuels grew at a four per cent annual rate. But soaring fuel prices have dampened demand and lowered that rate to the present 2.5 per cent.

Projections of future energy growth hinge on all sorts of assumptions — development in emerging nations, population increases, price effects, etc. Recessions, wars (especially nuclear), embargoes and other unpredictable

Climate zones in every continent would shift, changing food-growing patterns. In both hemispheres farming would extend further toward the poles, with losses for some crops and gains for others

Ecosystems, made up of plants and animals that interact within a natural balance, would be disrupted. As arable land turns to desert, and dry land turns green, some species, unable to adapt, would face extinction.

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While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the vexing questions, the immediate dilemma is what to do when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels — through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. Such policies, however, would have to be global. Indeed, they'd require a unique kind of international co-operation.

Another way of attacking the problem is to prepare for a warmer world. That could mean developing drought-resistant crops and new strains that would stand up to higher temperatures and utilize saltier water. It could mean improved irrigation and water management techniques, and better ways of protecting arable soil. It could require global food reserves and plans for massive disaster relief.

could alter the forecasts. So could the patterns of fuel use. For instance, natural gas burns off about 40 per cent less CO₂ per unit of energy than coal, and synthetic fuels emit about one third more. Thus, Soviet plans to tap vast Siberian gas resources or the development of a massive U. S. synfuels industry could reduce CO₂ buildup.

There is also the problem of detecting the warming caused by the "greenhouse effect" or, as scientists put it, "separating the signal from the noise." The "noise" is the normal fluctuations of the world climate. The "signal" is the CO₂-induced warming. The difficulty is compounded by the probable "lag effect" of the oceans. The oceans could soak up enough heat to delay detection of any abnormal warming trend by several decades.

And people? Some nations might benefit, but elsewhere changes in land use, ownership and settlement (as well as the availability of water) could put severe strains on society, producing widespread political upheaval.

Activities affecting our climate are forest cutting, pollutants, and nature itself.

Backneck harvesting of the world's tropical forests could increase the amount of CO₂ in the atmosphere. Trees use vast amounts of the gas in the process of photosynthesis.

In addition to CO₂ we are pumping millions of tons of other gases into what some scientists ironically call the "sewer in the sky:" nitrous oxide, sulphur dioxide, ozone, carbon monoxide, chlorofluoromethanes and methane. Besides other harmful effects, these gasses also contribute to infrared heat radiation.

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What does the world have to act? Many scientists agree with National Oceanic and Atmospheric Administration climatologist Lester Machta that we have another 10 to 15 years. "The uncertainties are large," he feels, "to say that some kind of positive actions have to be taken right now." Some agree with former CEQ chairman Gus Speth that the world can't wait until the uncertainties are narrow before moving.

So far though, scientists have voiced a lot more concern than policymakers. Indeed, the international scientific community is mobilizing to investigate the "greenhouse effect." In 1980, the World Meteorological Organization launched a Climate Impact Studies Program. And the United Nations Environment Program has organized a Global Environmental Monitoring System which is "assessing atmospheric pollution and its impact on climate."

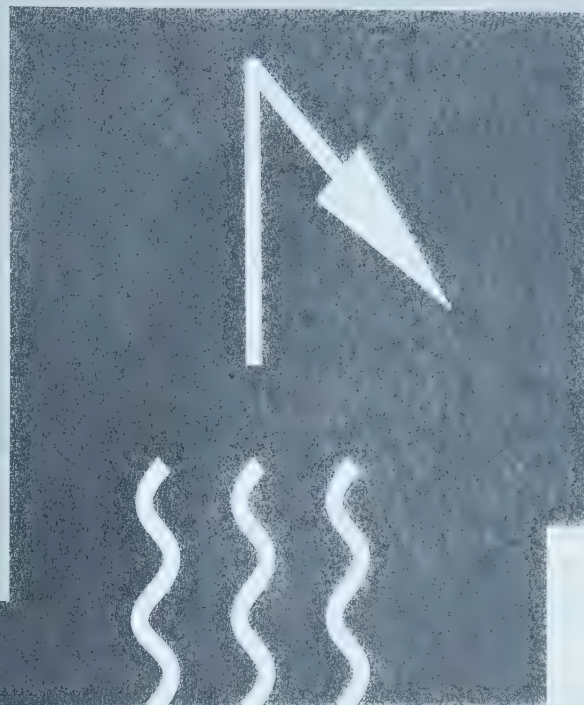
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Environment Report 1987

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International Wildlife Federation
216 16th Street NW
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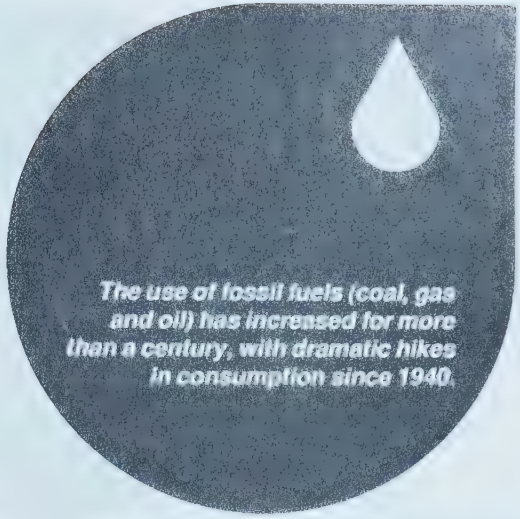
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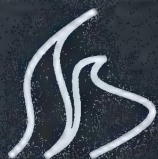
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Recently a number of the world's leading climate experts gathered at Boulder, Colorado, to put together what may be the longest-range weather forecast ever attempted. Their prediction isn't simply an academic exercise, however. It is in response to a growing threat which many of them say is changing the global environment in a way unprecedented in human history. By burning fossil fuels — coal, oil, and gas — man is gradually heating up the earth.

Experts are not sure exactly what the rate of change is — or what the effects might be. But the effects are potentially so sweeping that Gus Spence, former head of the President's Council on Environmental Quality (CEQ) in the United States, terms this problem "the ultimate environmental dilemma." The worst possible scenario is that by the middle of the next century, the planet could be warmer than at any time in the last 100,000 years. If that happened, growing zones, deserts, grasslands, and forests could all shift. Melting ice in the polar regions could raise sea levels 15 feet. The very way of life on our planet could be drastically altered. The cause of these potentially enormous changes in world climate involves an odorless, colourless gas called carbon dioxide (CO₂). A vital ingredient in photosynthesis — the process by which green plants grow and produce oxygen — it makes up less than .04 per cent of the atmosphere. But since the start of the Industrial Revolution in the late 1700's the amount of CO₂ in the air has increased by 15 to 25 per cent.



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The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO₂. Around half the CO₂ generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, ever higher concentrations of the gas build up. Since 1957, when systematic monitoring of atmospheric CO₂ was started, levels have increased by 7 per cent.

This virtually transparent layer of gas has little effect on the sunlight which passes through it to warm the earth. But infrared heat radiated back into the atmosphere from the planet's surface has a longer wavelength and some of it is consequently trapped by the CO₂, in a process that has been called "greenhouse effect."

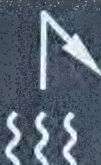
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A reduction in the temperature differential between the tropics and the polar regions would produce a weakening of the vast heat engine which drives the world's weather — the flow of warm air up from the equator toward the poles and the counterflow of cold air down from the poles toward the equator. At the same time, the surface waters of the oceans would become

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That's what scientists worry about. In the late 1970's, consumption of fossil fuels increased by about 2.5 per cent annually. If that rate continues, the CO₂ concentrations in the air will be double the pre-Industrial Revolution level by the middle of the next century. Such estimates come from computer models, and their projections

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As higher temperatures melt the west Antarctic ice sheet, sea levels could rise 15 feet or more. Shorelands around the globe could be inundated.

All of this could make the poles drier, subtropical regions wetter. However, David Burns of the American Association for the Advancement of Science, "what farmer wants to know is whether it's going to rain in July in Iowa." Researchers have been trying, in a general way, to answer such questions. They've not only taken computer models into account, but also studied warmer periods in the distant past.

One projection, based on such a study, is that the midwestern United States, the Soviet Union, and northern China as drier, and Europe, Africa, and north and west Africa as wetter. On the basis of this and other scientific projections, the rich midwest corn and wheat belt of the United States could become arid prairie. But the northern growing regions of the United States, Canada, and Russia could greatly benefit from a longer growing season. Parched areas in north and west Africa — including the Sahel — Mexico and much of Australia might turn green. Stronger, more regular monsoons could improve growing conditions for millions of the Indian sub-continent. All told, billions of millions of people could be affected, some for better, some for worse.

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e) The west Antarctic ice sheet could eventually melt. As a result, coastal areas throughout the world would be inundated. One study estimates that about 12 million North Americans would be uprooted, including more than 40 per cent of Florida's population.

6 **All of this may come to pass** — drastically changing the world as we know it today. But scientists are the first to concede the uncertainties. Take the various computer climate simulations, for example. These models are oversimplifications of extremely complex and imperfectly understood geophysical systems. The dynamics of oceans — their heat transport, currents and interactions with the atmosphere — are unclear, for instance. Add in other effects, such as the inter-relationships of land masses, snow and ice, vegetation and wind circulation, and the task of simulating future climate becomes complex indeed.

Just as perplexing is the question of how long it will take for the atmospheric concentrations of CO₂ to double from the nineteenth century levels. That depends in a large part, on the future growth and natural world energy consumption. From 1940 to 1970 the use of fossil fuels grew at a four per cent annual rate. But soaring fuel prices have dampened demand and lowered that rate to the present 2.5 per cent.

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While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the vexing questions, the immediate dilemma is what to do when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels — through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. Such policies, however, would have to be global. Indeed, they'd require a unique kind of international co-operation.

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There is also the problem of detecting the warming caused by the "greenhouse effect" or, as scientists put it, "separating the signal from the noise." The "noise" is the normal fluctuations of the world climate. The "signal" is the CO₂-induced warming. The difficulty is compounded by the probable "lag effect" of the oceans. The oceans could soak up enough heat to delay detection of any abnormal warming trend by several decades.



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What does the world have to act? Many scientists agree with National Oceanic and Atmospheric Administration climatologist Lester Machta that we have another 10 to 15 years. "The uncertainties are large," he feels, "to say that some kind of positive actions have to be taken right now." Some agree with former CEQ chairman Gus Speth that the world can't wait until the uncertainties are narrow before moving.

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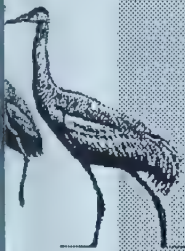
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Environment Report 1987

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K2A 1C4

National Wildlife Federation
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Washington, DC
20036

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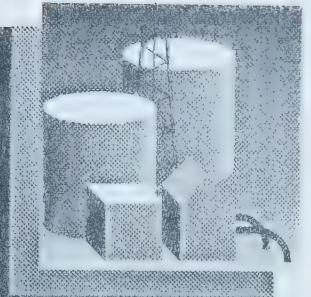
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The problem: the earth's climate is apparently warming up. *Eventually, the Antarctic ice cap could melt, raising sea levels around the world, inundating coastal cities. Growing regions shift. When we burn oil, coal and other fossil fuels carbon dioxide is produced. Some of it remains in the atmosphere where it traps heat from the earth. The situation is getting worse because we are burning more fossil fuels than ever before.*

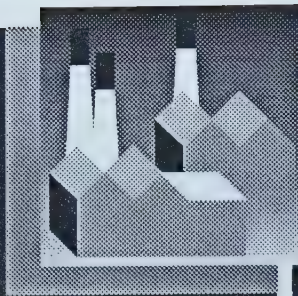


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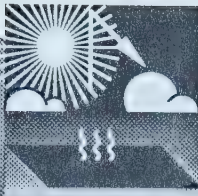
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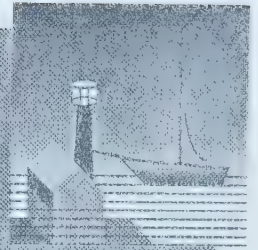
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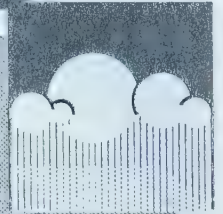
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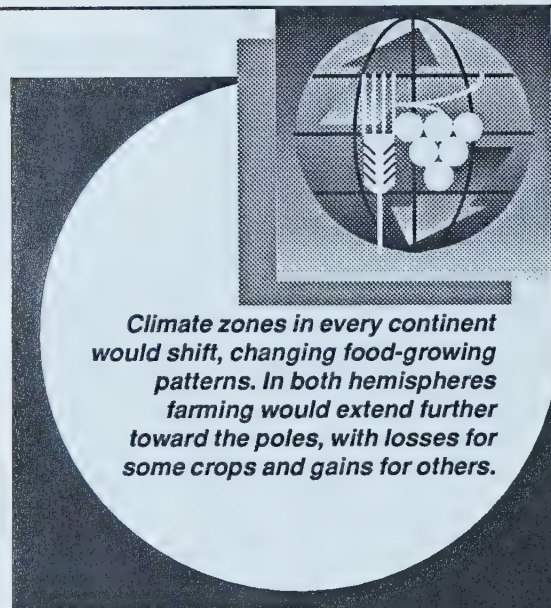
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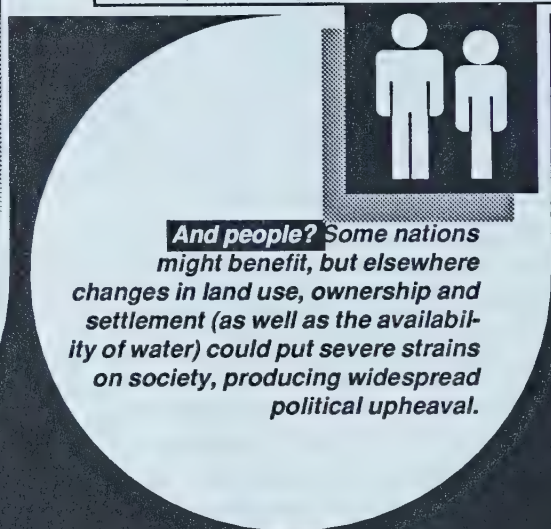
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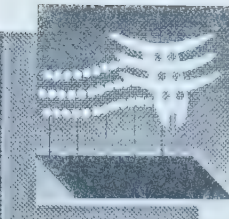
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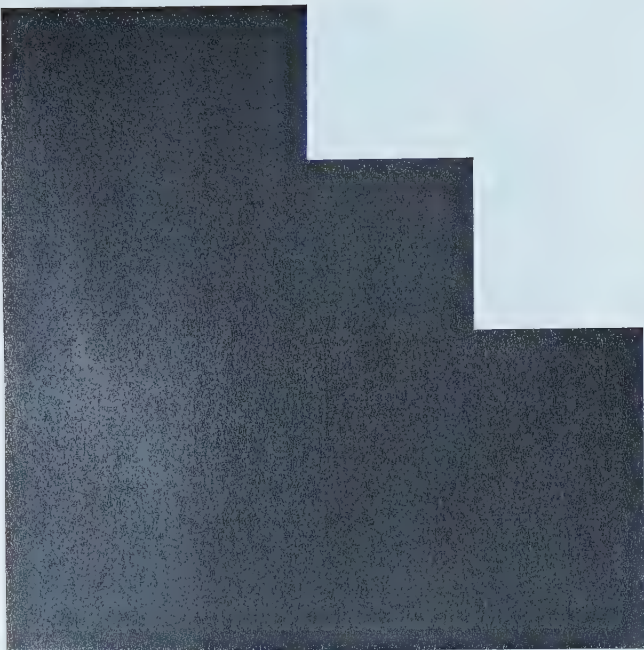
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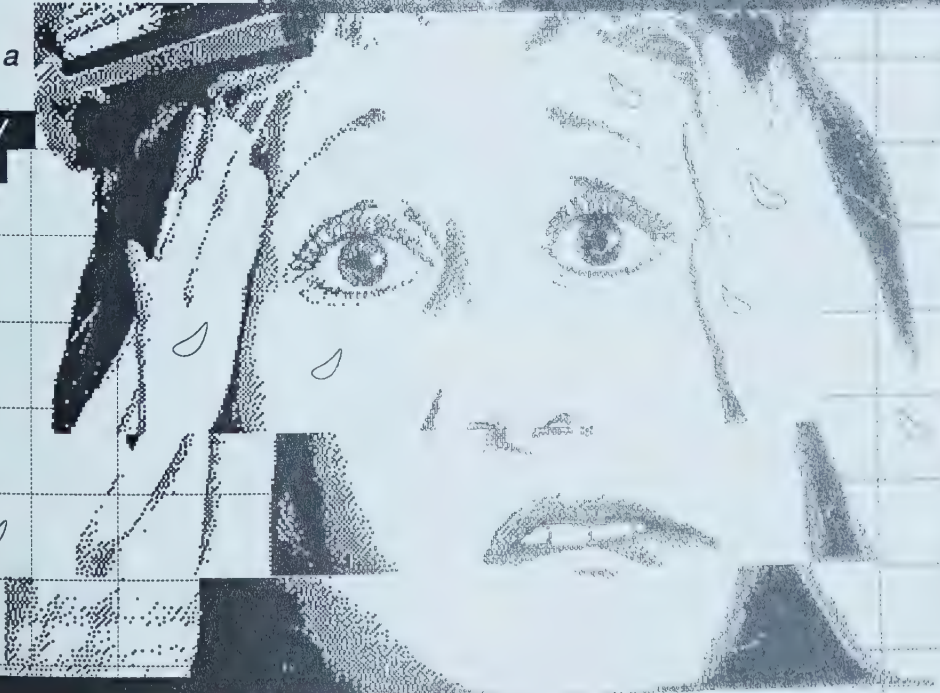
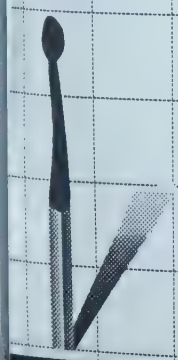
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CLIMATE crisis ?

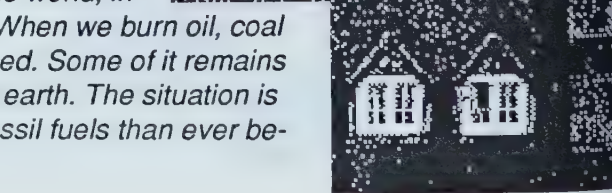
By Sam Iker

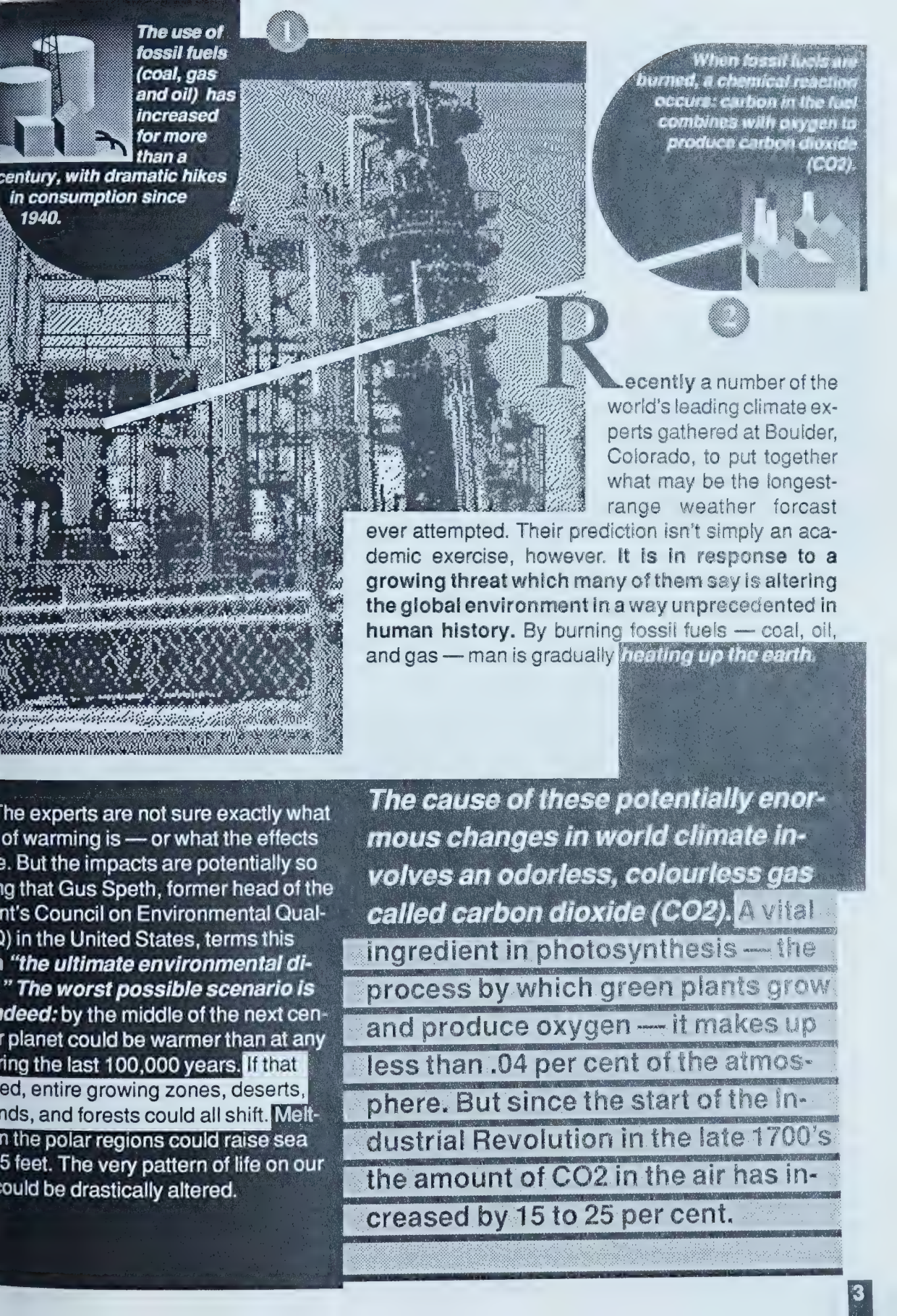


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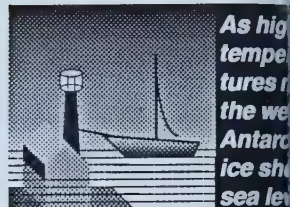
The rise is due to modern society's voracious appetite for energy. When fossil fuels are burned, stored-up carbon combines with oxygen in the air, forming CO2. Around half the CO2 generated each day is absorbed by the oceans or perhaps by green living matter. The other half remains to accumulate in the lower atmosphere. As more fossil fuels are burned, even higher concentrations of the

gas build up. Since 1957, when systematic monitoring of atmospheric CO2 was started, levels have increased by 7 per cent.

This virtually transparent layer of gas has little effect on the sunlight which passes through to warm the earth. But infrared heat radiated back to the atmosphere from the planet's surface at a longer wavelength and some of it is consequently trapped by the CO2, in a process that has been called a "greenhouse effect."

How much has this accumulation actually warmed the world's climate? "We apparently haven't affected the natural systems very much yet," says William Kellogg, a senior climatologist at the U.S. National Centre for Atmospheric Research. "The increase theoretically has been something on the order of one degree Fahrenheit. It's in the same ballpark as the natural fluctuations we've seen over the last 1000 years. When it gets near two degrees, then it'll dominate over the natural processes."

That's what scientists worry about. In the late 1970's, consumption of fossil fuels increased by about 2.5 per cent annually. If that rate continues, the CO2 concentrations in the air will be double the pre-Industrial Revolution level by the middle of the next century. Such estimates come from computer models, and their projections frequently do not agree. But most scientists concur that a doubling could raise the earth's average temperature from nearly three to as many as eight degrees Fahrenheit. The increase would be least in the tropics, somewhat greater in the Antarctic and still greater in the Arctic.



could rise 15 feet or more. Shorelands around the globe could be inundated.



duction in the temperature differential between the tropics and the polar regions would weaken the vast heat engine that drives the world's weather — the flow of warm air from the equator toward the poles and the flow of cold air down from the poles toward the equator. At the same time, the surface waters of the oceans would become warmer, and the circulation of ocean currents might diminish. The oceans profoundly influence the world's climate.

this could make the poles drier and the tropical regions wetter. However, says a member of the American Association for the Advancement of Science, "what the farmer is worried about now is whether it's going to rain in his field." Researchers have been trying, in vain, to answer such questions. "We have only taken computer climate models for the future, but also studied much data from the distant past.

projection, based on such a study, shows the southwestern United States, the Soviet Union, and northern China as drier, and Europe, the northern and west Africa as wetter. On the basis of this and other scientific projections, the great corn and wheat belt of the United States could become arid prairie. But the more southern regions of the United States, and Russia could greatly benefit from a longer growing season. Parched areas such as the Sahel in west Africa — including the Sahara — and much of Australia might again turn green. More regular monsoon rains would create better growing conditions for the nations of the African sub-continent. All told, hundreds of millions of people could be affected — some for the better, some for worse.

Indeed, the whole range of potential impacts from a world warm-up is a combination of pluses and minuses.

a Insect pests, which already destroy more than 35 per cent of the world's crops, would likely multiply in a warmer global climate. Crop diseases could also become more of a threat.

b Increased carbon dioxide in the air, which can enhance photosynthesis, could lessen the requirements for water and boost the yields of some crops.

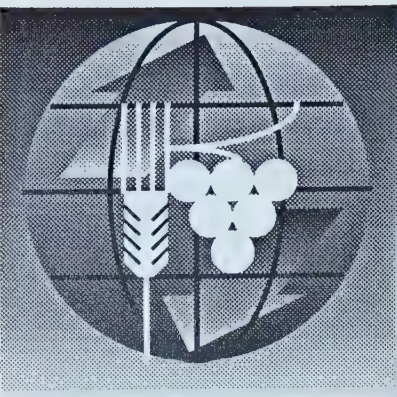
c The intricate balance of natural ecosystems could be upset. For the most part, wildlife would migrate with the climate, and survive. But species that live in specialized habitats might become extinct. Boundaries of some reserves and parks set up to save endangered species could become meaningless as rainfall and vegetation changes.

d Changes in ocean circulation and temperatures could hurt fisheries by disrupting the "upwelling" process which brings nutrients up from the depths.

e The west Antarctic ice sheet could eventually melt. As a result, coastal areas throughout the world would be inundated. One study estimates that about 12 million North Americans would be uprooted, including more than 40 per cent of Florida's population.

Rainfall patterns could change. Both increased precipitation and evaporation might result. Decreased rainfall might occur over northern China, the U.S.S.R. and the U.S.A. midwest, with increases in Africa and Europe.





7
Climate zones in every continent would shift, changing food-growing patterns. In both hemispheres farming would extend further toward the poles, with losses for some crops and gains for others.

8
Family life could be disrupted.

And people? Some nations might benefit, but elsewhere changes in land use, ownership and settlement (as well as the availability of water) could put severe strains on society, producing widespread political upheaval.



Is there a solution?

People can plan on two fronts:

- 1 Co-operate globally for long-range energy planning by stressing conservation and greater reliance on hydro, solar and other nonfossil energy sources.
- 2 Prepare for a warmer earth by developing drought-resistant crops, establishing a world food bank and improving water management.

While scientists at government laboratories and universities in many nations mobilize research efforts to answer all the vexing questions, the immediate dilemma is what to do when. One route is to slow down the accumulation of carbon dioxide in the atmosphere by reducing the consumption of fossil fuels — through energy conservation, greater energy efficiency and a determined shift to nonfossil energy sources. **Such policies, however, would have to be global. And they'd require a unique kind of international co-operation.**

Another way of attacking the problem is to prepare for a warmer world. That could mean developing drought-resistant crops and new strains that would stand up to higher temperatures and utilize saltier water. It could mean improved irrigation and water management techniques and better ways of protecting arable soil. It could require global food reserves and plans for massive disaster relief.

in emerging nations, population increases, price of oil, recessions, wars (especially nuclear), embargoes and unpredictable events could alter the forecasts. So could the terms of fuel use. For instance, natural gas throws off 57 per cent less CO₂ per unit of energy than coal, and synthetic natural gas emits about one third more. Thus, Soviet plans to tap Siberian gas resources or the development of massive synthetic natural gas industry could affect CO₂ buildup.

There is also the problem of detecting the global warm-up signal from the "greenhouse effect," or, as scientists put it, "separating the signal from the noise." The "noise" is the normal natural variability of the world climate. The "signal" is the CO₂-induced warming. The difficulties are compounded by the probable "lag" in the oceans. The oceans could soak up enough excess heat to delay detection of any abnormal warming trend by several decades.

Human activities affecting our climate are forest cutting, pollutants, and nature itself.

Deforestation and the harvesting of the world's tropical forests could increase the amount of CO₂ in the atmosphere since trees use vast amounts of the gas in the process of photosynthesis.

In addition to CO₂ we are pumping millions of tons of other gases into what some scientists have jokingly called the "sewer in the sky": nitrous oxide, sulphur dioxide, ozone, carbon monoxide, chlorofluoromethanes and methane. Besides other harmful effects, these gasses also contribute to infrared heat radiation.

A change in the tilt of the earth's axis slightly alters the angle at which it orbits the sun, influencing the amount of solar radiation received. Also, the quantity of radiation heat from the sun is not constant but fluctuates. Some scientists believe this combination has been a cause of the cycles of ice ages and warm climates on the earth.

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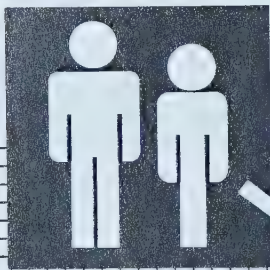
Ecosystems, made up of plants and animals that interact within a natural

balance, would be disrupted. As arable land turns to desert, and dry land turns green, some species, unable to adapt, would face ex-

How long does the world have to act? Many scientists agree with National Oceanic and Atmospheric Administration climatologist Lester Machta that we have another 10 to 15 years. "The uncertainties are too large," he feels, "to say that some kind of positive actions have to be taken right now." Scientists also agree with former CEQ chairman Gus Speth that the world can't wait until the uncertainties are narrowed before moving.

So far though, scientists have voiced a lot more concern than policymakers. Indeed, the international scientific community is mobilizing to investigate the "greenhouse effect." In 1980, the World Meteorological Organization launched a Climate Impact Studies Program. And the United Nations Environment Program has organized a Global Environmental Monitoring System which is "assessing global atmospheric pollution and its impact on climate."

The problem, notes climatologist William Kellogg, is that the "process of climate change is a slow one. And the democratic system isn't very good at taking long-range problems into account." But sooner or later, the world may have little choice. As David Burns put it, "we are burning the thin film of air and water upon which life on earth depends and messing around with it in an absolutely fundamental way — without really knowing the consequences of what we're doing."



2.2.3

Visual Transformation: Identity Scheme**Group 6**

These images constitute the traditional approach in which the typographic elements follow a logical hierarchy of information, accompanied by a graphic identifying mark. This approach, if pushed too far and applied universally, can lead to a general sameness in the appearance of identity schemes. It often eliminates possible elements before they have been adequately examined because the process of designing a symbol is a process of distillation (which implies elimination) of information. Often only a bare geometric form is left to represent a complex organization or process. While a strong graphic form (with its meaning lying entirely in extrinsic sources) may recommend itself for efficiency in its power of attraction, it does little to convey descriptive information about complex objects, organizations, or processes.

Plate 6a shows the basic elements of the letterhead, including the mark used by the Federation. In plate 6b a trope (metaphor) is used as an identifying mark. Objectives in wildlife management are difficult to identify. Solutions are difficult to separate from problems. It is like looking at birds in a forest, flora and fauna merge in camouflage. The image has a reduced level of iconicity with strong patterning, a desirable characteristic in an identifier. Plate 6c shows a different trope (metonymy) in which the many problems of wildlife management are represented by a plant growing in soil that is held in the hand. The soil it is growing in is running out the bottom suggesting a likeness between the real problem and the one depicted.

Group 7

This group of images shows some experiments in broadening the descriptive and informative aspects of the identifier. One representative feature (birds) of the Federation's concerns has been selected to represent (synecdochically) the whole spectrum of wildlife and its management. Birds are a good symbol because of their almost universal habitation, even in cities otherwise mostly devoid of nature. They represent freedom, the aim the Federation has for all wildlife. Showing birds in different habitats would be a way of representing this aim. This group of examples shows three

classes of birds, one seen primarily in the water, one on the ground, and the other in the air. While it shows variety in nature, the variations occur within a single visual form or mark.

Group 8

The idea of variation can be expanded to include all of the different pieces of official documents issued by the Federation. 8a is the design of letterhead in current use. The identifying mark is not very descriptive of the bird being depicted nor representative of the aims of the Federation, which is to promote the happy relationship between man and the environment, allowing for the continuation of a free and unencumbered nature. By showing different species in characteristic stance on different pieces the entire scheme becomes more descriptive and informative. There is dynamic interaction between all the components of the visual scheme. There is controlled change in the visual representation which is better able to communicate what the Federation is about. Each piece contributes only a small amount of information. Therefore a personality of the organization emerges through the combined effect of all the printed matter.



The use of the personal computer can encourage the introduction of frequent changes because of the amount of control the user has over each component. Type (as well as pictures) can be freely positioned and changed easily. Therefore a question arises as to how different phrases and even different languages can be made to interact in space. Objects and type blocks can be made to inter-penetrate. Therefore it is a tool that can be used in a design approach different from the traditional distillation process in identifiers as well as different treatment of space. It can encourage the use of dynamic thematic variations in visual systems. However, like in the design of the booklet, it puts great demand on the designer to maintain the integrity of the scheme. Which elements will remain constant? Which will change, and how? The personal computer, while making it easy to manipulate images, does not simplify the process of combining them for purposes of communication. It provides a means of storing and accessing a variety of verbal and pictorial information. Using rhetoric as a means of selecting different

words and pictures from the computer's storage to be used in the synthesizing process can make for organic and interactive visual form rather than static form. But the same basic questions that have always confronted designers remain. How does the visual form affect communication? Is it up-to-date, eye-catching, interesting, unusual, complex, inviting, etc.? Is it readable? Is it legible?

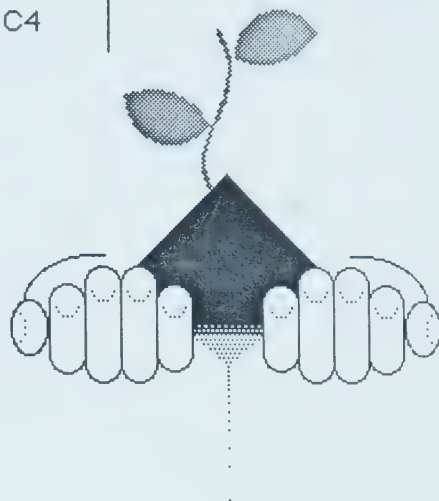
PLATES
Group 6

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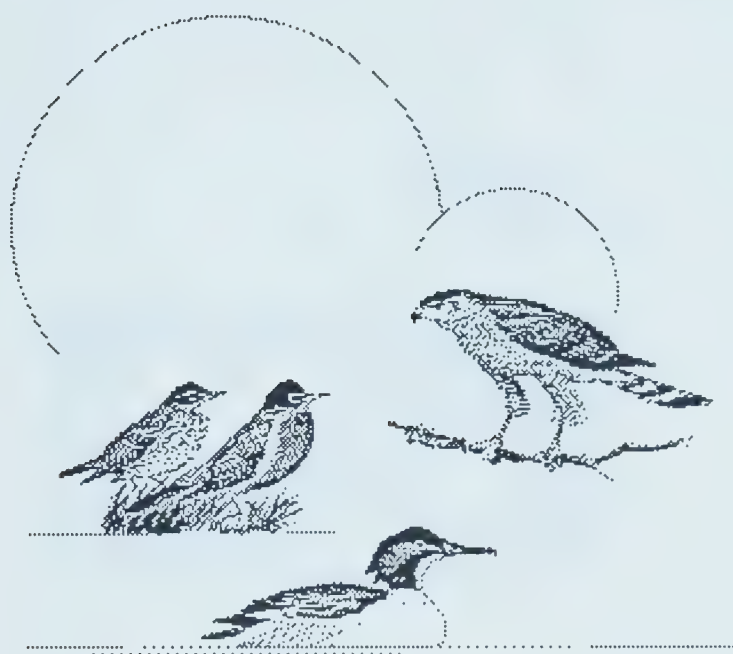
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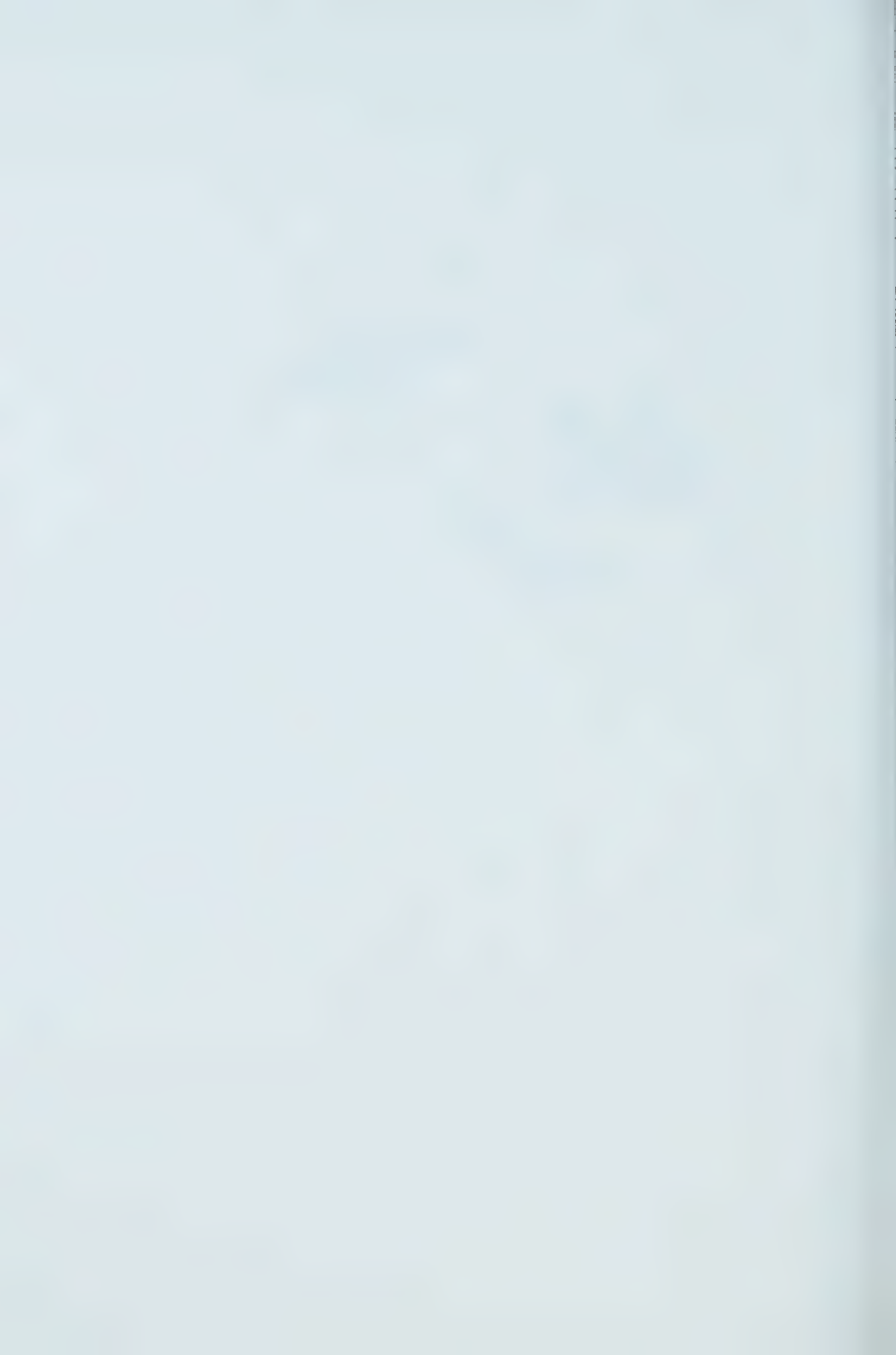


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PLATES
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Ottawa Ontario
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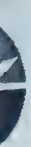
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PLATES
Group 8



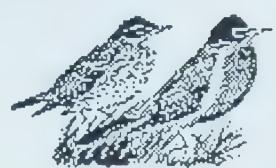
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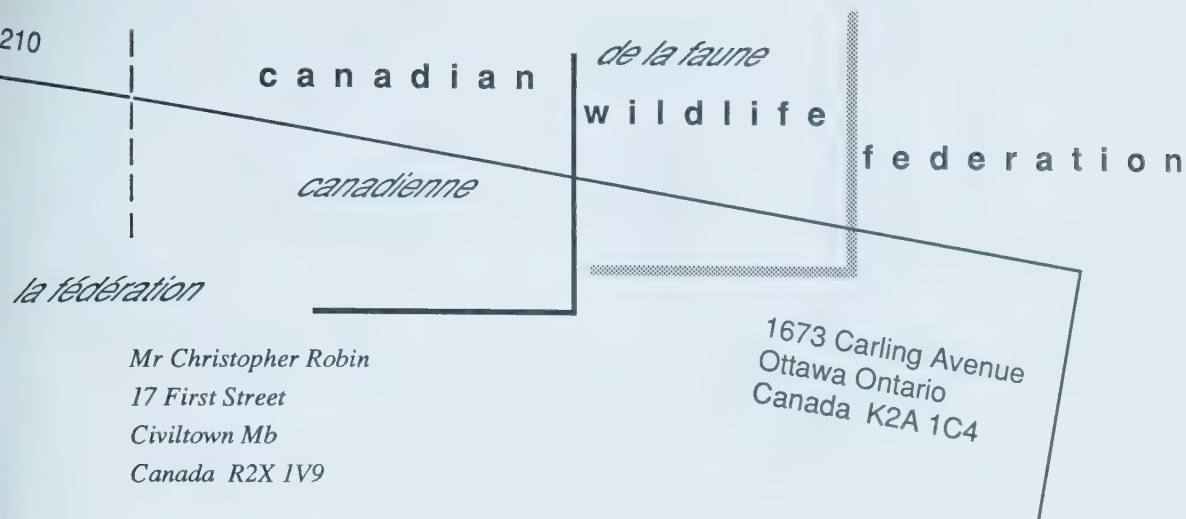
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canadienne

la fédération

1673 Carling Avenue
Ottawa Ontario
Canada K2A 1C4





Mr Christopher Robin
17 First Street
Civiltown Mb
Canada R2X 1V9

27 June 1987

Dear Christopher

This is a sample of the stationery design for the Canadian Wildlife Federation, which is a part of an overall identity scheme



for the Federation. Although this is a preliminary study, it gives a good impression of what the scheme will look like. There is no single "rubberstamp" logo which has been so familiar in the past, rather a personality of the organization is developed by a continuing series of thematic variations in all of the communication pieces. Different birds appear, usually in pairs, on every piece of communication, each contributing to the overall personality. Birds were chosen because of their almost universal habitation, even in cities which are otherwise mostly devoid of nature. Indeed some species thrive in urban settings. Birds were also chosen because of the tradition of using the Canada Goose as an identifier. Birds also represent freedom, an aim the Federation has for all wildlife. In addition, birds, with their various plumages and body shapes provide interesting visual form worthy of any piece of Federation communication. As well as having different birds on each piece, the typography too is variable. Variety as to typeface, position, direction, weight, etc. further contribute to the overall personality of the Federation through an ever-changing array of communication pieces.

Sincerely

William Wren

*la fédération
canadienne
de la faune*

**canadian
wildlife
federation**

1673 Carling Avenue
Ottawa Ontario
Canada K2A 1C4



dedicated to the wise use of the earth's resources

c a n a d i a n

dedicated to the wise use of the earth's resources

w i l d l i f e

la fédération

f e d e r a t i o n

canadienne

de la faune

Dennis Pattinson
President

1673 Carling Avenue
Ottawa Ontario
Canada K2A 1C4

(613) 357 2210



1673 Carling Avenue
Ottawa Ontario
Canada K2A 1C4

(613) 357 2210

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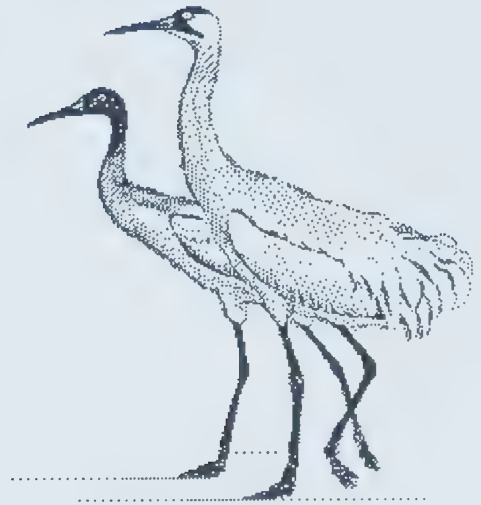


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1412 16th Street NW
Washington DC
USA 20036

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PART 2

A Background to Rhetoric and Communication

1.1 Making

Graphic representation constitutes one of the most widespread methods of understanding thoughts, storing information for future retrieval, and for communicating with one another. It is a language for the eye, and can take advantage of all the properties made available by the faculty of sight-perception.

In speaking of graphic representation I am making a deliberate connection between *all* the acts of perceiving with the eye intentionally-made marks. I am speaking of the visual marks of word-concepts and of picture-concepts equally, because in both instances there is a process whereby concepts are *represented* by visual marks – that is, concepts are encoded physically so that someone else may interpret them. Therefore one might say that in both instances (because of the conjunction of interpretation and physical mediation) the acts of perception are acts of language. Both the perception of “words” and the perception of “pictures” are identical in that sense. In natural language our own bodies are the agencies whereby the physical mediation occurs: larynx, tongue, lips, air, ears, gestures, glances, eyes. We are both word and picture. But in all other acts of mediation (except for scratching marks in the dirt with ones finger) the physical mediators must be made by the use of devices external to ourselves, leaving an external record. Therefore in language two things are necessarily brought together, first, the making of something perceivable, and second, the implications of the thing made.

The making of anything implies technique. Indeed, language is the basis for technique, a word derived from the Greek *techné*, meaning art, or more specifically the art of performing. It is exercising deliberate control of expression. And in expressing ourselves by natural language the passions are directly involved in our performance. We must bellow to be heard in a crowd, and in the act the blood rises, or conversely, we are irritated by something and the blood rises along with the voice. Without passion no bellow is possible. A bellow *is* an impassioned act. Therefore technique is innate, and the user of natural language is obliged, however minimally, to learn the craft of balancing emotion with diction and gesture in expression as normal behaviour. But in the technique of

graphic representation the emotions and gesture are no longer so involved, but become concepts to be mediated, or conversely, suppressed in the interest of objectivity. Because the technique lies in the manipulation of externals, in expressive activities external to man there is a *conflict* of impassioned "man in himself" and the technique being employed. *This duality is the essence of the art of graphic representation.* A "thinking about," or rationalizing process is involved. We must rationalize the technique; we must learn it as literacy. Language is a mixed activity, and the complexity of it can be elucidated by an example of expression in Jacques Ellul's book on the topic of technique. He says (in a different but appropriate context), "I may be compared with a physician or a physicist who is describing a group situation in which he is himself involved. The physician in an epidemic, the physicist exposed to radioactivity: in such situations the mind may remain cold and lucid, and the method objective, but there is inevitably a profound tension of the whole being."¹ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*. Vintage, New York, 1964, Foreword.

The literate individual is in all acts of expression in a state of tension.

The word "technique" today no longer only (nor primarily) applies to art, indeed it may mean quite the opposite. Today it implies the *means* for achieving anything. And not only *a* means, but the best means. But best in only one particular sense. To rationalize without the passions. Technology (a combination of the Greek *techne*, art + *logos*, systematic treating of words) today means the *most logical* (in the strict sense) way of doing something. It means applying the most logical mechanism to anything, including language. While it is beyond the scope of this study to explore its general development, its effects on language must be included because this premise underlies the whole of our culture.² ● See Lewis Mumford. *Technics and Civilization*. Harcourt, Brace and Co., New York, 1938; Siegfried Giedion. *Mechanization Takes Command*. Oxford University Press, Oxford, 1948; Jacques Ellul. *The Technological Society*. Vintage, New York, 1964; Jacques Ellul, trans. by Joachim Neugroschel. *The Technological System*. Continuum, New York, 1980.

And it poses a particular problem for the art of language in which the concept finds its origin, because of the tension in expression. Indeed it poses a far deeper ontological problem.³ ● See Jeremy Rifkin. *Entropy*. Viking, New York, 1980, esp. Parts 1 and 3.

Jacques Ellul has pointed out that art, though it is concrete, is subjective, and science, though objective in its description of reality

is abstract; only “technique” is at once both concrete and objective in that it creates the reality it describes.⁴ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. xvii.

There are seven characteristics inherent in the concept of technology which makes this so. They are its, rationality, artifice, automatism, self-augmentation, monism, universalism, and autonomy.⁵ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, pp. 78-147.

They may be outlined as follows:

1 Rationality: *Everything* that is subjected to a process of making is brought into the realm of mechanics, including natural language out of which the concept grew. At its root we find “dialogue” – the mechanics of *people* in communication (communion), it allows the passionate and non-rational. But when a mechanical paradigm is applied to dialogue itself, immediately the non-rational is disallowed and there emerges “... a reduction of facts, forces, phenomena, means, and instruments to a schema of logic.”⁵ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 79. It is on principle a reduction of spontaneous activity. Community becomes bureaucracy. When a rational paradigm is applied to everything, it is best exemplified in the setting of production standards, introducing systems of operation, the division of labour, etc., becoming the corporation as we have known it in the modern period.⁶ ● Max Weber in Alvin Toffler. *Future Shock* Random House, New York, 1970, pp. 109-10.

2 Artifice: “Making” is the manipulation of things pre-existent in nature. It invades nature. “Technique is opposed to nature. Art, artifice, artificial: technique as art is the creation of an artificial system.”⁷ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 79.

A tree must be cut to make lumber. In that sense means are always artificial. The result is the creation of a world completely different from the natural one – realism and *trame l’œil* notwithstanding. And it takes on a momentum of its own in which representing the real may be re-interpreted in terms of its artificial self. “Just as hydroelectric installations take waterfalls and lead them into conduits, so the technical milieu *absorbs the natural*”⁸ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 79. My emphasis.

Nature is re-interpreted and the artificial is a new "nature."

3 Automatism: Once the mechanical paradigm is applied to dialogue a chain of events must follow. The best rational way must, above all else (if it is to remain true and consistent), be sought in everything. Hence it becomes self-regulating. "When everything has been measured and calculated mathematically so that the method which has been decided upon is satisfactory from the rational point of view, and when, from the practical point of view, the method is manifestly the most efficient of all those hitherto employed or those in competition with it, then the technical movement becomes self-directing."⁹ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 80.

The only choices that are left to be made are between rational variables in every situation. "The worst reproach modern society can level is the charge that some person or system is impeding this technical automatism."¹⁰ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 80.

4 Self-augmentation: Once accepted, "technique" induces everyone to seek its improvement. Two senses may be identified. First. "The worker is asked not only to use the machine he operates, but also to study it to find flaws in its operation, then to find remedies against these faults, and in addition to determine how its productivity might be improved."¹¹ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 86. No one is exempt. Computer software, for example, is developed according to a vast network of feedback from users. Second. This results in multiplying the numbers and kind of technical innovations. People seek ways of applying them in fields other than those for which they were primarily sought. In this "technique" gives the world the appearance of providing improvement in every quarter, and "... techniques combine with one another, and the more given techniques there are to be combined, the more combinations are possible."¹² ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 91.

As an example Ellul uses the phenomenon of propaganda, (unavoidable in a technological age) which is the meeting of techniques in communication, psychology, commerce, and authoritative government. The self-augmentation of "technique"

absorbs man unequivocally into its own machinations. It does not take into account the purposes of man (good or bad), in that respect, "It evolves in a purely causal way: the combination of previous elements furnishes the new technical elements." ¹³● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 97.

This leads directly to the next characteristic.

5 Monism: "Technique" imposes a sameness of approach (logic) to diverse situations, whether, religious, political, commercial, educational, etc. Logically, "technique" embraces all lesser and more specific techniques. Any application contrary to this is not within the realm of technique and is contrary to its rules, for example, using the car as a mobile ashtray. ¹⁴● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 97. Or take armament as an example. If the destruction of life is intended then the application of technique must necessarily seek the most efficient (logical) means possible to achieve it. "Technique" is in every regard logical, which led to the application of atomic research first to the phenomenon of war because the uncontrolled release of energy represented by far the simplest and most logical application, much simpler than controlled industrial use. (In that sense, given the fact that war is one of the human universals, ¹⁵● See Kenneth Burke. *Counter-Statement*. University of California Press, Berkely, 1968. He identifies speech, use of material, religion, myth, property, social order, government, and war as absolutes inborn in the "germ-plasm of man." the destructive force had to *precede* the constructive.) ¹⁶● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*: Vintage, New York, 1964, p. 99.

This points up the principle, that "technique" moves from primary and direct applications (simple and easy) by its logic to secondary ones (complex and difficult). In the secondary phase lies a necessity of linking together more and more complex techniques, which gives the underlying monism a diverse appearance. This principle results in the next.

6 Universalism: The chain of events within "technique" cannot be broken as long as it is embraced as "good." It eventually comes to include more and more activities and ideas. It becomes the definition of civilization, to the detriment of all other civilizations (which from its perspective no longer have the status of civilization at all).

"Without exception in the course of history, *technique belonged to a civilization* and was merely a single element among a host of nontechnical activities. Today *technique has taken over the whole of civilization*. Certainly technique is no longer the simple machine substitute for human labor. It has come to be the 'intervention into the very substance not only of the inorganic but also of the organic.'"

¹⁷ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*. Vintage, New York, 1964, p. 129.

"Technique" has invaded every facet of life in every continent of the planet, both the "what" and the "how" of thought and life, from religion and art to science and labour. And where it has not yet it is about to. A. Moles says, "... the entire globe is tending to become a vast megalopolis, in which the parcels of nature still resisting this invincible thrust are merely a residual phenomenon: the logical and inexorable state is the artificial ..."

¹⁸ ● A. Moles quoted by Jacques Ellul, trans. by Joachim Neugroschel. *The Technological System*. Continuum, New York, 1980, p. 169.

7 Autonomy: This is the *condition* engendered by having embraced technique. Science qua science limits itself to explaining the "how" of things, but when absorbed into "technique," science desacralizes everything it attempts to explain. "Technique" disavows a quality "of the same nature as the perceiving self"

¹⁹ ● Owen Barfield. *Saving the Appearances*. Faber and Faber, London, 1957, p. 42.

existing in the universe because "technique" "... worships nothing, respects nothing. It has a single role: to strip off externals, to bring everything to light, and by rational use transform everything into means. ... technique desacralizes because it demonstrates (by evidence and not by reason, through use and not through books) that mystery does not exist."

²⁰ ● Jacques Ellul, trans. by John Wilkinson. *The Technological Society*. Vintage, New York, 1964, p. 142.

The explanations of "technical" science attempt to reduce consciousness to a property of the material, and a "unity of intelligence and nature" holds no credence.

²¹ ● Owen Barfield. *Saving the Appearances*. Faber and Faber, London, 1957, p. 42.

"Technique" attempts to make the materiality of existence autonomous. Only a "how" exists.

These seven characteristics, which describe premises of the technological world we live in, pose a particular problem for language because the techniques begin to point only to themselves and thus

fail to mediate between human beings. George Grant says,

The unfolding of modern society has not only required the criticism of all older standards of human excellence, but has at its heart that trust in the overcoming of chance which leads us back to judge every human situation as being solvable in terms of technology. As moderns we have no standards by which to judge particular techniques, except standards welling up with our faith in technical expansion. To describe this situation as a difficulty implies that it is no inevitable historicist predicament. It is to say that its overcoming could only be achieved by living in the full light of its presence. Indeed the situation of liberalism in which it is increasingly difficult for our freedom to have any content by which to judge techniques except in their own terms is present in all advanced industrial countries.²² • George Grant. *Technology and Empire*. House of Anansi, Toronto, 1969, p. 34.

Yet the "how" and the "what" of language cannot be irreconcilably separated if language is to remain communicative in human terms. Language has no autonomy. And it is precisely on this ground that language is most resistant to the domination of "technique," and can, even in a technological world, *through the application of technology* include the spontaneous, the non-rational, and the human. "Technique" can be resisted on its own ground. Ellul says that once "technique" has replaced all other ideas of civilization at a profound level and is truly universal, then everywhere cultural "essence will be identical; they will be techniques. And what *differences* there are will result from the cold calculations of some technician, instead of being the result of the profound spiritual and material effort of generations of human beings. Instead of the expression of man's essence, they will be the *accidents* of what is essential: technique."²³ • Jacques Ellul, trans. by John Wilkinson. *The Technological Society*. Vintage, New York, 1964, p. 131. My emphasis. And it is precisely *in* the accident of the technical essence where language can exert its influence and make individuals individual – a small toe-hold in the technological monolith – because at absolute bottom language still motivates technology. In fact the major commodity of "technique" is now communication. It is what John Naisbitt calls the "new wealth of know-how,"²⁴ • John Naisbitt. *Megatrends*. Warner Books Inc., New York, 1982, p. 15. necessitated by the universal application of "technique."

The computer is the technique of this commodity, if not its origin. It began as the most logical means of quantification and organization, and quickly grew into a centralized corporate tool. But

the computer has become "personal." Where it began as a monolithic "mainframe" machine operated from a central source, it now is individual, with self-contained operations and is used independently, or in a network with other individual machines. Centrality is no longer endemic to it. Indeed, the personal aspect is very much a description of its function as a *personal communicative device*. And herein lies the irony of the computer as a technique. In the monism of "technique" every primary application diversifies into numerous secondary ones. While in its primary application as "technique," computer language is reduced to the status of mathematics, in the secondary phase of "technique," which we are now entering, the computer is also a purveyor of language in the community, allowing for individual expression to a wide audience, bypassing traditional techniques engendered by the invention of movable type and the art of printing. In the hands of individuals the expression that was once denied by the advent of print technology (with its division of labour, specialized skills, etc., all characteristic of "technique") is restored by the advent of the computer. Where "technique" "... alone is rigorously objective. It blots out all personal opinions. It effaces all individual, and even collective modes of expression;"²⁵ • Jacques Ellul, trans. by John Wilkinson. *The Technological Society*; Vintage, New York, 1964, p. 131.

where the computer is a device thoroughly technical, it has an element that affords *freedom in expression* to all who would explore its potential. If this freedom is to be realized then individual communicators using the computer to make "words" and "pictures" are obliged to understand graphic representation and meaning.

1.2 Implications of the Thing Made

In every representation of "words" and "pictures" there is always a certain amount of ambiguity. Not every element is immediately understandable. In writing, for example, the first task is to make visible marks that are interpretable by the reader as word-concepts; then to so arrange them in the two-dimensional space of a page that thoughts emerge in the mind of the perceiver, building into ever increasing circles of meaning as concept touches concept. The placement of smaller conceptual entities (letters, words, phrases, sentences, paragraphs, etc.) in space induces the reader to build a complex mental image in a particular way. Apart from illegibility, as in poor penmanship, the reader may find it difficult to accept the

marks seen for what they represent if there is disparity between concepts and visual form (e.g. misspelled words, a non-alphabetized telephone directory, speaking of something delicate but using a heavy typeface, etc.). The reader's repertoire of knowledge and belief, that is called upon to complete the interpretation of the form, may tell him that he perceives a falsehood, and that the form misrepresents the concepts. However, in the interest of provocative expression the writer may purposely utilize ambiguity. Thus, while a given page may have been read, and "thoughts" been conveyed (in which the writer and the reader have both participated), the degree to which the thoughts of the two are in agreement is, consequently, always a variable factor partially dependent on the visual form.

So too in the perception of a photograph or a drawing. Not each shape has an obvious meaning. There are questionable forms: "What does this represent? or, What does that represent? or, Is that a person? What is he or she doing?" etc. While the picture-maker so composes the dark and light forms on the page as to bear certain concepts, these emerge as "thoughts" in the mind of the viewer only when the viewer brings his or her own repertoire of knowledge and belief to bear on the marks that are seen on the page. And it may not immediately (or ever) coincide precisely with the picture-maker's. For example, a tree may have been intended but the viewer comprehended a lollipop. The ambiguity of the possibility of lollipop trees is an enrichment of language. Ambiguity is inherent in expression and as long as it does not produce obscurity it is useful to the skilled communicator in supplying nuances and emphases.

In every instance of language perception the repertoire of knowledge and belief is involved, and it varies from one individual to the next according to personality, environment, culture, etc. – that is, it is a necessary antecedent to interpretation and is always in relation to the forms seen. (And of course the perceiver may disbelieve the concepts on any grounds other than formal misinterpretation.) There is a general problem of meaning confronting the graphic communicator.

In our culture, we have a strong division between the disciplines of "writing" and "art" embedded in our technological history. The invention of typography and printing has, unfortunately, contributed to this situation. It's invention represents a logical development – scribes could not produce enough copies of reading matter. Whereas the beginning of the art lay in the hands of scholars it quickly became

technological and entrepreneurial, and the art of printing became completely technicized and witnessed a rapid process of the division of labour into many specialties.²⁶ See Elizabeth Eisenstein. *The Printing Press as an Agent of Change*. Cambridge University Press, Cambridge, 1979, esp. Part 1.

There has been a "mystique" surrounding the art of printing ever since, in which the ordinary literate individual has had no involvement (because of the specialized nature of the skills needed). So we have come to conceive of writing as being distinct from printing, the "making process," resulting in the lack of understanding, beyond a superficial level, of visual form as an integral part of the concepts conveyed. Form-giving has necessarily been left to the specialist typographer and graphic designer. This has resulted in a problem of partial literacy in which most individuals have been happy to leave a crucial part of expression to someone else. Hence in a technological society, in language-use, there exists a general problem of form. We speak of the form of an essay but rarely include in our meaning its visible form. Consequently, there is a tendency to see writing and art as unrelated, and the visible marks of which these two activities are comprised as being sheerly different. While we have come to make a close connection between the concept of writing and language, we have paid little heed to a more fundamental connection between graphic representation generally and language. In so doing we have impoverished both the art of writing and the plastic arts.

That writing is *visual form* is treated only in a cursory manner in our educational system. That there is a fundamental connection between the conceptual function of all the visual marks of communication is not at all well understood, except insofar as we say a picture "illustrates" a text, or a diagram explains a concept. But what, exactly, apart from the fact that they occupy space in the same page, is the functional connection between the graphic marks of texts and pictures? And of their combination to meaning?

In writing we may teach form-giving by another name – penmanship, typing, word-processing, etc. – as a mere expedient. At the least this yields only a superficial understanding of form (from within "technique"). But for most individuals the functional use of visual form as a factor contributing to the expression of concepts remains unaccounted for in language, making no connection between the *form* of "writing" and the *form* of "pictures" – that is, understanding form itself as being conceptual. This principle of the

"pictureness" of language, except as an abstract and descriptive word-concept, is rarely considered as an act of "writing."

By the emphasis placed on writing within this narrow view, the idea of "picture-making" as an integral component of language has consequently languished in our culture, and language arts, beyond the primary grades, involve little use of visual form in the expression of concepts, prohibiting the average literate individual from absorbing it as an integral part of his or her understanding and use of language in the normal course of education. And for many art (in its broadest sense) has become an anomalous activity, a view reinforced in a technological world by virtue of the incompatibility between the relentless rationalism of "technique" and the non-rational ambiguous component inherent in expression.

Furthermore, there exists a view concerning all of the arts which contributes to the problem – the idea of "genius" in the artist. While it is true that certain individuals achieve levels of expression superior to most, it is their dedication to the craft and their involvements with people and their ideas, animals and their actions, and things in their surroundings that contribute to the quality of their work. Genius is a well-honed craft (technique in its original sense); it is a fallacy (spawned of "technique") to assume genius to be a state of mind. Underpinning genius is the knowledge of principles, which can be learned, and on which the practice of an individual's expression can be based.

Eric Gill has said that art is the well-making of what needs making. Because the delivery of messages is being done more and more by "personal" technology: personal computers, polaroid cameras, scanners, photocopy machines, and laser printers, the "mystique" historically engendered in the art of printing is evaporating. The advent of this "personal" technology places the control over the form of the reproduced image in the hands of individual communicators. Ultimately this means that the responsibility of form-giving lies in the hands of ordinary literate individuals, giving a sense of urgency to problems of form. They must lay hold of the art, not to be "geniuses," but to inform, persuade, and entertain. Like the scribe of pre-print times, in a society where most are scribes, literate individuals must make well what needs making. Therefore problems of visual composition that once were left to printing specialists need now to be solved by non-specialists and questions about the formal characteristics of

graphic representation and their relation to concepts arise for ordinary communicators.

And it is this same technology that makes possible the exploration of form in ways hitherto impossible. For example, with new technology the disposition of space in the page is much freer – in the possible number of divisions, in the placement of elements, in their directional orientations, in the handling of pictures – yielding a more complete integration of words and pictures. The page is an integrated expressive unit.

Where letterpress printing yielded a very rational page by virtue of the “squareness” of the type-metal and the intransigence of the column, new technology is less constrained by such physical encumbrances. In digital technology physical constraints on form are reduced to the limits of the raster and the control made possible by software over each pixel. The page can be freely composed. In some respects it is not unlike the freedom available to the calligrapher.

When technology becomes less constraining on form where do formal guidelines come from? They must arise in the concepts of the graphic representation itself – that is, from the word-concepts and picture-concepts. The rational page design afforded by letterpress printing (and carried on in offset lithography) as it developed through “technique” has a certain affinity to the written word. But language is in the first instance not written. And graphic representation is not limited to verbal language. Furthermore, language is intimately connected to perception and comprehension in general. Therefore with new technology many assumptions about communication through graphic representation from the perspective of “technique” can be challenged. Steve Jobs, at the Seybold conference on desktop publishing,²⁷ ● News Article. “Designer Layouts,” *MacWorld* February, 1987, p. 103.

entertained the idea that formats could be pre-made like designer clothes, which is a technocratic view that is anathema to the very concept of language, and entirely anti-expressive. That such things will occur is assured from within “technique,” but if new technology is to free individuals from the dominance of “technique,” individuals need to hone the craft of word-use in conjunction with picture-use because there is no such thing as a “ready-made” format for language. Each different configuration of conceptual associations is necessarily mediated by different form if it is to be truly expressive

of those concepts – that is, expression and technique must necessarily be combined (as in the origin of the word technique).

Where traditional printing technology comprises many specializations which bar the average individual from mastering it as a method of form-giving, new technology is available to many as a creative medium, breaking down, on at least one front, the universality of “technique.” Where picture-making is relegated to an extra-curricular activity in the general education of technological society, digital graphics technology demands of everyone a measure of proficiency in conceptualizing through visual form. Where “technological” history has given us pre-conceptions about the *distinction* between the nature of words and the nature of pictures, digital technology is a means for breaking down those pre-conceptions and for improving the level of verbal/visual literacy for individuals. But the answer is not a technological one, it is a conceptual one – the very concept of form as a source of meaning in language. While in the comprehension of words and pictures alike the same interpretive faculty is involved (the repertoire of knowledge and belief), and in both, concepts are mediated by visual marks, it must be understood that the marks have different effects. In each *the different tasks that the visual marks perform* must be appreciated for what they are. And digital technology, in the personal computer, provides an easier way of appreciating and working with the problem than does pre-digital technology.

2 Towards Efficacy in Communication

2.1 Communication and Concepts

The question has been raised as to how it is possible to distinguish between communication (by the use of natural language or some other perceivable means) and other forms of causation.¹ ● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 221.

If someone tells another individual to jump in the well, and he does so because he is convinced that it is the thing to do, then that someone has communicated with the other individual. If someone merely pushes another in, even though the result appears to be the same, the first individual has not communicated with the second. The push is merely a direct cause/effect relationship, the receiver had no option in the matter. Every act of telling someone something leaves the individual free to respond in any number of ways, including of course, to respond by doing the thing that he was told. The distinguishing factor between general causation and communication lies in the minds of the sender and receiver. The results from the command and the push may be the same to someone else, but to the communicants there is a vast difference. The states of mind are manifestly different in the two situations. The message sender may, of course, wish that another individual be down the well, but through the act of communication assumes that the other individual has the right to the option of coming to the same conclusion on the matter.

² ● Jacque Ellul. *The Ethics of Freedom*. William B. Eerdmans Publishing Co., Grand Rapids, 1976; Jacque Ellul *Propaganda*. Alfred A. Knopf, New York, 1964. Communication, then, is characterized by the receiver to be capable of responding in a variety of ways.³ ● C. S. Pierce says that the distinction between a true sign and any other form of causation lies in the fact that every sign must be capable of evoking another sign. This definition implies a potentially endless interconnection such as we find in language. A sign may evoke an infinite variety of responses. W. B. Gallie. *Pierce and Pragmatism*. Pelican Books Ltd., Harmondsworth, 1952, p. 136.

If in every communication situation the sender must leave the receiver free, then every communicator is always obliged to engage in a process of persuasion. This means that there must be an appeal of some kind made to the receiver from within the state of freedom. The receiver must come to hold in his own repertoire of knowledge and belief ideas which concur with those of the sender. This idea of free communication has always been maintained and confirmed by

myth as the highest good that is attainable.⁴ This process of persuasion is always in danger of being subverted by either accidental or deliberate negation of the state of freedom. See C. S. Lewis. *The Abolition of Man* (1943) Fount, Glasgow, 1978, esp. p. 27.

Language is that agent which makes ideas accessible, both to the thoughtful self and to someone else. Language has no existence apart from thought and hence apart from communication. Language is essential to the general state of knowing. C. S. Lewis says:

There is no reason to suppose that self-consciousness, the recognition of a creature by itself as a "self", can exist except in contrast with an "other", a something which is not the self. It is against an environment, and preferably a social environment, an environment of other selves, that the awareness of Myself stands out. . . . Again, the freedom of a creature must mean freedom to choose: and choice implies the existence of things to choose between. A creature with no environment would have no choices to make: so that freedom, like self-consciousness (if they are not, indeed, the same thing) again demands the presence to the self of something other than the self.⁵ C. S. Lewis. *The Problem of Pain*. (1940) Fount, Collins, Glasgow, 1979, p. 17.

Language forms the substance of an "area of accessibility" lying outside of every individual in a communication situation, but in which any number of individuals can participate. Colin Cherry says:

The very word "communicate" means "share," and inasmuch as you and I are communicating at this moment, we are one. Not so much a union as a unity. Inasmuch as we agree, we say that we *are of one mind*, or, again, that we understand *one another*. This one another is the unity. A group of people, a society, a culture, I would define as "people in communication." . . . Inasmuch as that conformity is the greater or the less, so is the unity. The degree of communication, the sharing, the conformity, is a measure of one-mindedness. After all, what we share, we can not each have as our own possession, and no single person in this world has ever been born and bred in utter isolation. "No man is an island, entire of itself."⁶ Colin Cherry. *On Human Communication*. The MIT Press, Cambridge, 1957, p. 4.

This area of accessibility can be schematically shown as in figure 1.

But unity is not a mere mental sharing. Because knowing demands the existence of an environment, for physical creatures language extends into the physical world, it has an "inside" and an "outside". It cannot exist without the duality.

People often talk as if nothing were easier than for two naked minds to "meet" or become aware of each other. But I see no possibility of their doing so except in a common medium which forms their "external world" or environment. Even

shared agency
not the sole property
of one or the other

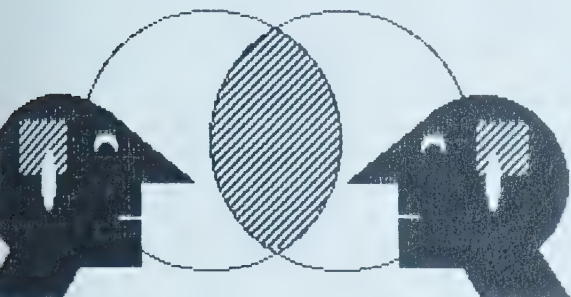


Figure 1: The Area of Accessibility

When one individual intends to make known his experience, he does so within a communication situation and must manipulate some agency in the environment to achieve communion. This means that something which is not the sole property of either one or the other mind must exist between them to form the bond. Something is shared and commonly understood by them within an area of accessibility.

our vague attempts to imagine such a meeting between disembodied spirits usually slips in surreptitiously the idea of, at least, a common space and common time, to give the *co-* in *co-existence* a meaning: and space and time are already an environment. But more than this is required. If your thoughts and passions were directly present to me, like my own, without any mark of externality or otherness, how should I distinguish them from mine? And what thoughts or passions could we begin to have without objects to think and feel about? Nay, could I even begin to have the concept of "external" and "other" unless I had experiences of "externality"? ... What we need for human society is exactly what we have — a neutral something, neither you nor I, which we can both manipulate so as to make signs to each other. ... Matter, which keeps souls apart, also brings them together. It enables each of us to have an "outside" as well as an "inside", so that acts of will and thought for you are noises and glances for me; you are enabled not only to *be*, but to *appear*: and hence I have the pleasure of making your acquaintance. ⁷ ● C. S. Lewis. *The problem of Pain*. Collins, Glasgow, 1940, pp. 18-19.

The "outside" of natural language is both utterance and gesture. ⁸ ● See also Max Müller. *Lectures on the Science of Language*. Longmans, Green and Co., London, 1873, pp. 344ff.

These aural and visual components are the *agencies* of sentence but not the *substance*. The substance lies elsewhere — in consciousness. Sharing is possible only insofar as the physicality of language is *apprehended* and the substance is *comprehended*. In this the "inside" and the "outside" must show co-operation. Thus language is never the mere dress of thought.

The co-operative relationship between the "outside" verbal and visual aspects of language and the "inside" process of knowing (through the area of accessibility) establishes the foundation of natural language, and by extension, graphic representation. It is the giving of form (physicality) to concepts that the graphic communicator is attempting to do.

On the assumption that communication only occurs between free individuals, how can appeal be made to people? How can a communicator make concepts both perceivable and meaningful in human terms? Aristotle says that appeal can only be made by addressing basic human characteristics. These characteristics are fundamental psychic and visceral attributes: *logos*, which is the appeal to reason; *pathos*, which is the appeal to emotion; and *ethos*, which is spiritual appeal. ⁹ ● See Aristotle, trans. by Lane Cooper. *Rhetoric*. Appleton-Century-Crofts, New York, 1960.

Appeal to any or all of these attributes may be engaged in in the attempt to persuade someone. Natural language, with its "inside"

conceptual associations and its "outside" physicality is imbued with the potential for generating a response according to these three attributes; this is the essence of language. The art of generating a desired response is to engage in the art of rhetoric.

This, consequently, has a practical communicative outworking. When appeal is made to these attributes three concomitant things occur: the first of which is that rhetoric works to make tractable or to teach because it is reasonable, *docere*; the second is that it stirs or arouses emotions resulting in action, *movere*; and finally that it makes people identify with something beyond themselves – it pleases, gives joy and satisfaction to the spirit, *delectare*.

Language is a highly flexible agglomeration of cognitive relationships and physical appearances cradling this tri-part human essence; rhetoric is the means whereby this may be utilized in the formation of human bonds.¹⁰ See Cicero, ed. and trans. by E. W. Sutton. *De Oratore*. Harvard University Press, Cambridge, 1942, \$21.69 and Augustine, trans. by D. W. Robertson, Jr. *De Doctrina Christiana*. Library of Liberal Arts, Indianapolis, 1958, pp. 136ff.

From this general background it is possible to put graphic representation into perspective. By definition it is limited to the forming of concepts through visible forms. Michael Twyman has used the general model developed by language theorists, and built on it a model suitable for including graphic representation in the larger picture of language – the main distinction is not between spoken and written language, as in the linguistic model, but between *verbal* and *pictorial* language because both verbal and pictorial attributes are visual.¹¹ Michael Twyman. "The Graphic Presentation of Language," *Information Design Journal*. No. 3, Vol. 1, 1982, pp. 2-22.

Because the state of knowing is fluid, without one-to-one conceptual relationships, it is through manipulating the intrinsic labyrinth of possible cognitive relationships, that all language can be used to either heighten or lessen its persuasiveness – the efficacy of language. It is the requisite of every communicator to manipulate conceptual relationships through a form-giving process in such a way as to heighten the level of participation through appeal to *logos*, *pathos*, and *ethos*, but without usurping the state of freedom. This manipulation takes place on two levels. First, the ordinary positionings of signs can be altered to heighten the impact of concepts. These are known as *schemes* (e.g. "High-strung are caged animals, sometimes" as compared with "Caged animals are

sometimes high-strung.") Second, the intentional meanings of concepts can be altered to broaden and diversify the range of conceptual associations. These are known as *tropes* (e.g. "The very stones cry out for revenge." as compared with "Vengeance was in order.") All language, whether verbal or pictorial, is subject to being treated in either of these two ways.

When language is perceived in a communication situation it is primarily via one of two natural receptors: the ears or the eyes. In graphic representation the thing seen has to be made by external means. It can be a signal made with the hand, non-graphically like signing for the deaf, or be made graphically either by a hand-tool as in writing and drawing, or by the use of more complex devices like computers and cameras. What is *intended* by the sender will be some manner of appeal to one or more of the human characteristics described above. What is perceived will be some *form* of language engaging schemes or tropes or both in the making of the appeal. It must be understood that even something as ordinary as a telephone listing is utilizing schemes in order to make the listing comprehensible.

Language defined on this model can be shown schematically as in figure 2. For my purpose it is the connection between the items in bold type at the top of the diagram, and those at the bottom that is of primary importance. This relationship is affected by the graphic methods employed in the creation of the graphic representation of language.

2.2 Concepts and Technique

The words "rhetoric" and "oratory" have traditionally been applied to both the theory or method of efficacy in language and to its product; that is, to both the "how" of language and to the "what" of language. The person delivering the product was the rhetor. The delivery was oral delivery. The person investigating and promulgating the theory was the rhetorician.

While the origin was within the oral tradition, with terminology having a decidedly oral bias, the ideas of rhetoric are not limited to speaking. There has always been a link between the flighty nature of thought and speech and an attempt to capture it. Sometimes the rhetorical acts of communication were committed to paper before the act of oration (as notes forming a part of the systematic selection of concepts), or after delivery as a means of mere record. However, since its inception as a theory in the Greek tradition, rhetoric has also been associated with the practice of rendering in writing and circulating with the intention to be read for persuasive ends what was primarily conceived of as oration – for example, Socrates's defense as it is written by Plato in the *Apology*, or the discourses of the Gospels. So despite the oral origin of rhetoric, the principles are applicable to a wider scope. The meaning of the terminology, although oral, is easily understood in the bigger field.

But when committed to paper after delivery the nature of the rhetoric is no longer identical to the oral. The discourses of the Gospels in written form no longer stand alone but contain additional pertinent material made available to the rhetor by the medium of writing. Since the invention of the art of typography and printing, the press has been used quite independently of oration as a rhetorical medium.¹² ● See Elizabeth L. Eisenstein. *The Printing Press as an Agent of Change*. University of Cambridge Press, Cambridge, 1979, esp. pp. 71–159, and Peter Klassen. *Europe in the Reformation*. Prentice-Hall Inc., Englewood Cliffs, 1979, pp. 35ff, for examples of independent thinkers, agitators, reformers, teachers, preachers, etc. using the press quite independently of the podium as a medium of rhetoric.

Now the scope of rhetoric has broadened even more, especially since the ideas of Kenneth Burke and the "new rhetoric"¹³ ● Kenneth Burke. *A Rhetoric of Motives*. George Braziller, Inc., New York, 1950, Introduction, and "Rhetoric Old and New", *The Journal of General Education*, Vol. 5, 1951, p. 203.

have worked their way into the fabric of scholarship, to all media of communication in general because of the greater understanding that

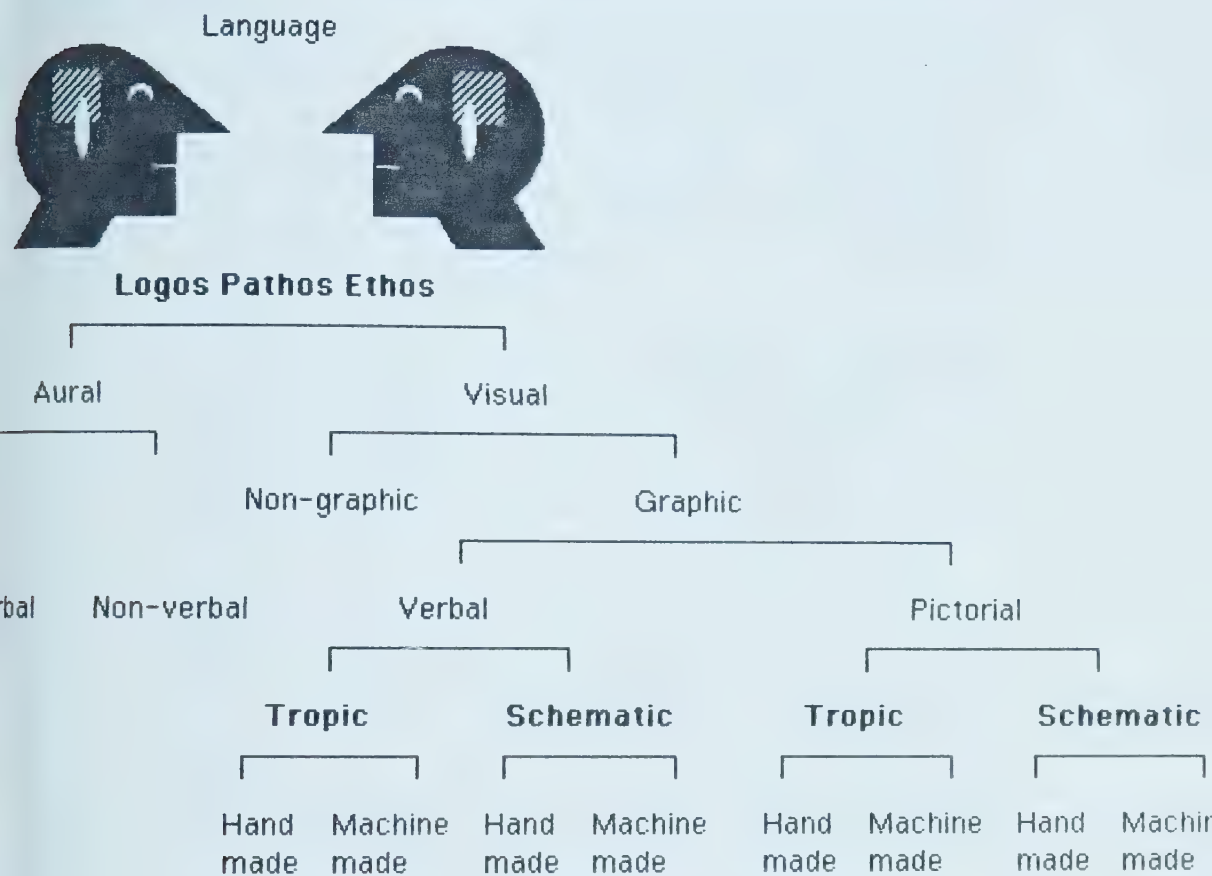


Figure 2: Branches of Language

A schematic arrangement of the branches of language as a model for communication through graphic representation. The items in bold type at the top are the human attributes to which appeal can be made, the items in bold type at the bottom are the variables whereby this can be achieved. Adapted from Michael Twyman in "The Graphic Presentation of Language," *Information Design Journal*. Vol.3, No. 1, 1982, pp. 2-22.)

has been gained of the dynamic relationship between mind and language.

Despite the range of meaning that history has come to associate with the word rhetoric (including a concept opposite to the essential one), it has retained at its core the rationale of informative and suasive discourse.¹⁴ ● Donald C. Bryant. "Rhetoric: Its Functions and its Scope". *Concepts of Communication* Jimmie D. Trent, Judith S. Trent, and Daniel J. O'Neill, ed., Allyn and Bacon, Inc., Boston, 1973, p. 10. See also Edward P. J. Corbett. *Classical Rhetoric for the Modern Student* Oxford University Press, New York, 1965, pp. 535ff.

Given the fact that all of communication is thoroughly infiltrated with persuasiveness, it is necessary for a message instigator to be aware of and make use of any and all of the means available for the efficacy of language. The communicator attempts to bring into association various conceptual entities to that end; this is a systematic approach to the creation and presentation of those ideas. Cicero says that every message must consist of a language of power and elegance accommodated to the feelings and understandings of mankind, with the intention to utilize every available means to persuade the perceiver.¹⁵ ● Cicero, ed. and trans. by E. W. Sutton. *De Oratore* Harvard University Press, Cambridge, 1942, Bk. 1. This is the art of rhetoric. It is a process of systematic selectivity for particular ends, and it is the establishment of meaning in human terms (it is technique). This the communicator must bring to bear on the physicality of sign systems.

What I will establish in the following chapters is largely concurrent with Burkeian thought: that language is *essentially* rhetorical, and that consequently graphic representation too is rhetorical. It is only by means of efficacious language that individuals are able to seek and obtain a sense of order in both private personality and in the community. Daniel Fogarty, in commenting on Burke says, "Not only in intrapersonal relations, where man uses his rhetoric on himself, where he holds inner parliament as both speaker and hearer, but, in all his interpersonal, intergroup, and interclass relations, he is striving for status in an accepted order, for survival by social balance with his inner self and with his world."¹⁶ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 56. See also Kenneth Burke. *A Rhetoric of Motives*. George Braziller, Inc., New York, 1950, p. 39.

Burke, like C. S. Lewis, recognizes the essential position of physical nature (including man himself) and its manipulation in the formation

of symbols by individuals for both the appearance and the understanding of other individuals. ¹⁷● Compare C. S. Lewis. *The Problem of Pain*. Collins, Glasgow, 1940, pp. 18-19 and Kenneth Burke. *A Rhetoric of Motives*. George Braziller, Inc., New York, 1950, pp. 39-42.

The order of a physical community can only exist by virtue of the language possessed by each individual. And language can only operate by substituting physical utterances, gestures or graphic representations for thoughts. Fogarty says, "The simplest visceral urgency within him, he translates, with the help of his symbol-making power, into a gesture or phrase that modifies the visceral urgency, or explains it away, but always in terms of the order he is building for himself." ¹⁸● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 60.

Rhetoric is therefore a means for the ordering of symbols (technique) for the express good of the community.

2.2.1 The Nature and Compass of Rhetoric

Aristotle's system, although more limited than what is suggested here, remains as a good foundation. "New" rhetoric does not contradict the classical.

Rhetoric is not limited to any particular kind of inquiry and discourse, it has within its scope no subject that might be defined as its own. But it also does not apply to all subjects. Aristotle said that what is contingent, that which people dispute over, falls within the range of rhetoric. It deals with things that are not certainly known and perhaps not certainly knowable at all. It deals with questions of practical living, giving truth effectiveness in people's lives. ¹⁹● Baldwin, Charles Sears. *Ancient Rhetoric and Poetic*. MacMillan, New York, 1924, p. 5.

It considers what happens to the audience, "usually a popular audience or lay audience as distinguished from the specialized or technical audience of the scientific or dialectical demonstration. This distinction, strictly speaking, is a practical rather than a logical limitation, a limitation of degree rather than kind. No matter what the audience, when the speaker evinces skill in getting into their minds, he evinces rhetorical skill." ²⁰● Donald C. Bryant. "Rhetoric: Its Functions and its Scope." *Concepts of Communication*. Jimmie D. Trent, Judith S. Trent, and Daniel J. O'Neill, ed., Allyn and Bacon, Inc., Boston, 1973, p. 13.

Rhetoric therefore deals with ongoing questions which have varying degrees of probability. Rhetorical discourse proceeds from probable antecedents to probable conclusions. It deals with reasonableness

and informed opinion. Unlike mathematics, physics, and scholastic theology it is not primarily concerned with formal logic and universals.²¹ ● Logic is based on the method of mathematical certainty and therefore attains a very high degree of probability because it limits its premises to those admissible by its mathematical methodology. Rhetoric admits probability into its method for the benefit of ordinary people. It exists for an ordinary world where there is a high degree of uncertainty – a world of factual knowledge on the one hand and on the other pure whimsey. Language and consciousness, and therefore rhetoric, although an orderly technique, cannot be reduced to “technique.” Burke says that rhetoric “... must lead us through the Scramble, the Wrangle of the Market Place, the flurries and flare-ups of the Human Barnyard, the Give and Take ... at times its endless competition can add up to the transcending of itself. In ways of its own, it can move from factional to universal.”²² ● Kenneth Burke. *A Rhetoric of Motives*. George Braziller, Inc., New York, 1950, p. 23. My emphasis.

It is at once rational and non-rational, loaded with common sense and emotion. It has a mythic dimension.

A complete rhetoric draws from both the rational and non-rational faculties of consciousness. Bryant says that it:

... knows the whole man and seeks to bring to bear the whole man in achieving its ends – what he is and what he thinks he is, what he believes and what he thinks he believes, what he wants and what he tells himself he wants. Towards its special ends, rhetoric recognizes the primacy of rational processes, their primacy in time as well as in importance, as Bacon’s definition implies – applying reason to the imagination. Just so poetry recognizes the primacy for its purposes of the imagination. But rhetoric has always been akin to poetry – for long periods of history it has in fact annexed poetry – in its recognition of the honest and highly important power of imagination and of that emotion which does not supplant but supports reason, and sometimes even transcends it.²³ ● Donald C. Bryant. “Rhetoric: Its Functions and its Scope.” *Concepts of Communication* ed. by Jimmie D. Trent, Judith S. Trent, and Daniel J. O’Neill, Allyn and Bacon, Inc., Boston, 1973, pp. 25-6.

In rhetoric there is a balancing of imaginative realization and rational determination: in other words, reasonableness. It is from this premise that rhetoric proceeds.

Rhetoric is at its root *formal*, which rises up like sap through the whole tree of theory and application. It organizes linguistic concepts. It brings informed opinions together so that ordinary people can become informed about some subject and are thus able to establish

meanings. In this, rhetoric is a method of problem solving. Bryant says, "The resolving of such problems is the province of the 'Good man skilled in speaking.' It always has been, and it still is. . . . And the comprehensive rationale of the functioning of that good man so far as he is skilled in speaking, so far as he is a wielder of public opinion, is rhetoric."²⁴ ● Donald C. Bryant. "Rhetoric: Its Functions and its Scope." *Concepts of Communication* ed. by Jimmie D. Trent, Judith S. Trent, and Daniel J. O'Neill, Allyn and Bacon, Inc., Boston, 1973, p. 14.

For the communicator this raises an interesting and vital question. If rhetoric is concerned with practical subjects consisting of informed opinion, must the rhetor be a specialist in all subjects? Is there an individual like Cicero's ideal orator, with full understanding in all areas of activity? As general knowledge has increased and the fields of activity have multiplied there is less and less likelihood of anyone attaining such a status. What is fundamental to rhetoric, then, is that its method be built upon information gathering. If an advocate employs rhetoric about any subject, drug abuse for example, he does not need to become a pharmaceutical expert. He must, like a good administrator, have vital knowledge of the workings of every aspect of the subject without specialized skill in any of them. Hudson says:

He attempts to learn the authorities and the sources of information in each, and to develop a method which he can apply to specific problems as they arise. He learns, in any given situation, what questions to ask and to answer. The peculiar contribution of the rhetorician is the discovery and use, to the common good, of those things which move men to [understanding and] action.²⁵ ● Hoyt H. Hudson, "Field of Rhetoric." *Quarterly Journal of Speech* Vol. 9, 1923, p. 177.

The rhetor belies his ignorance about specialized skills by depending on those of others. He aligns his own inquiries to match those of the specialist in any field. If the pharmacist is developing a new drug to control some symptom or cure some ailment, he must investigate the nature of the substance and its effects on the complex physiological mechanism of the body. He must uncover its good and ill effects; whether or not it can be abused. If the substance for any reason becomes widely available in society, the publicist must ensure that the knowledge gathered about pharmaceuticals is sound if he is to encourage or discourage its use. He employs rhetoric. Neither the pharmacist nor the rhetor can remain ignorant lest they

become careless or dishonest. Whether any one rhetor can gather all the pertinent information on even one subject is, however, doubtful.

Therefore rhetoric is an ongoing act of communication; of presenting different views of a subject. Rhetoric is concerned with truth. Bryant, quoting Aristotle, observes in his defense of rhetoric that, "truth itself has a tendency to prevail over error; but in competition with error, where skillful men have an interest in making error prevail, truth needs the help of as attractive and revealing a setting as possible. In the Kingdom of Heaven, truth may be its own sole advocate, but it needs mighty help if it is to survive in health among the nations on earth."²⁶ ● Donald C. Bryant. "Rhetoric: Its Functions and its Scope". *Concepts of Communication* Jimmie D. Trent, Judith S. Trent, and Daniel J. O'Neill, ed., Allyn and Bacon, Inc., Boston, 1973, p. 18.

Rhetoric is the locus of language and consciousness. It is precisely within its domain where thought touches action and where communication, in its broadest sense, occurs. Where social intercourse at both its best and its worst can occur. Rhetoric is what makes language efficacious in the lives of people and binds them into bundles of cohorts; into communities.

Communities consist of various norms being adopted which exist as appearances to individuals. If rhetoric has free reign then what is desirable and workable will appear as it ought; there is the possibility of confluence of truth and appearance. No aspect of life can in this sense be exempt from rhetoric. "Rhetoric at the command of honest men strives that what is desirable shall appear desirable, that what is vicious shall appear vicious."²⁷ ● Donald C. Bryant. "Rhetoric: Its Functions and its Scope". *Concepts of Communication* Jimmie D. Trent, Judith S. Trent, and Daniel J. O'Neill, ed., Allyn and Bacon, Inc., Boston, 1973, p. 18. That sophistries will emerge given the human condition is a certainty, but with an understanding of the strength and compass of rhetoric they too may be demolished because rhetoric is not static but active as mythico-linguistic concepts are active and participatory. Thus in its domain are both war-mongers and peace makers. Rhetoric is primarily concerned with the conjunction of ideas (in a general sense) with the thoughts, emotions, motives, and behaviour of ordinary individuals. It is concerned with every level of meaning. As new ideas emerge and merge with old ones it is the rhetorical process of linguistic efficacy that will do the demolishing. And because life is not lived in a moment, rhetoric cannot cease, but must work constantly to bring new ideas into the arena of probability

and reasonableness and workability.

What we have, then, is that in rhetoric, thought and the physical form made necessary by acts of communication, are brought together as a single operation. This is equally so for natural language and for graphic representation.

From this discussion the first of a number of propositions can be stated:

Thought and form, made necessary by acts of communication, reside in a single operation in the art of rhetoric.

In all language, Burke says, "one talks about a thing by talking about something else."²⁸ ● Kenneth Burke. *Counter-Statement* Hermes Publications, Los Altos, 1953, p. 141.

This re-playing of thoughts in another mode brings various concepts into proximity for the sign percipient through the rhetorical art. One might say that language, or sign-making is akin to dramatic *re-enactment* of ideas or events; there is a natural affinity between the making of signs and dramatization.

Therefore language has to do with the "appearing" of something perceivable as representamen of concepts. Thus effective communication has come to be associated with physical appearance, with style or manner of delivery. Corbett says, "[Style] is another of the 'available means of persuasion,' another of the means of arousing the appropriate emotional response in the audience, and another of the means of establishing the proper ethical image. If the student adopts this *functional notion of style*... he will begin to regard style in the way Stendhal conceived of it: 'Style is this: to add to a given thought all the circumstances fitted to produce the whole effect that the thought is intended to produce.'"²⁹ ● Edward P. J. Corbett. *Classical Rhetoric for the Modern Student* Oxford University Press, New York, 1965, p. 385. My emphasis.

In the process of making concepts perceivable classical rhetoric has, since its inception, been concerned with basic procedures of styling or form-giving. Clear communication has always been achieved when there has first been a search for expressive and effective concepts about some topic, and an equally effective delivery, styled to affect the persuasion and motivation of the

receiver.

At any time that people have sought to define the means of effective expression similar principles are laid down. Since Cicero's time, the process of the discovery of ideas and their effective delivery has been divided into five categories as follows:³⁰ ● Edward P. J. Corbett. *Classical Rhetoric for the Modern Student*. Oxford University Press, New York, 1965, pp. 22-8.

- 1 (*inventio*) the act of discovering ideas, or inventing ideas to support the case in hand.
- 2 (*dispositio*) the act of arranging the discovered ideas.
- 3 (*elocutio*) the form that the ideas take; their expressiveness in shaping meaning based on the choice of signs and sign attributes according to:
 - a) *aptum*: appropriateness with reference to the subject.
 - b) *puratis*: correctness of expression.
 - c) *perspicuitas*: comprehensibility of expression.
 - d) *ornatus*: adornment or embellishment.
- 4 (*memoria*) the memorization of the whole.
- 5 (*pronuntiatio*) the timbre of the voice, the gesture, and the setting of the delivery.

In scholastic philosophy this consisted in beginning with a set of questions applied to every situation of inquiry: who? what? with what assistance? where? why? how? when? In other words, what are the ramifications of the full dimensions of a given communicative act; and of the specific signs being used? These are the basis for any investigative enquiry, and have always been taught as the foundation of good journalism.³¹ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 63.

In Kenneth Burke's "new rhetoric" the method of questioning is approached from the point of view of the unique symbol-oriented basis of consciousness and action. He says that people are all dramatists because their "substance" is perceivable only through the symbolisms of their language. Hence everyone is at all times engaged in re-enactment. This is the basis for Burke's "new rhetoric," which he designates as a dramatistic view of language in man.³² ● See Kenneth Burke. "A Dramatistic View of the Origin of Language," *Quarterly Journal of Speech* Vol. 38, 1952, pp. 256-59.

This approach can form a bridge between the concepts of natural

language and those of graphic representation.

In his view one must begin, in any communication situation, from etymological analysis and carry on an "inner dialogue" in an attempt to yield additional dimensions to the same problem via a "kind of dialectical horseplay;" ³³ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 61.

a banter of opposing concepts whereby truth emerges. This provides the basis for a multiplicity of the quest; to always go back and repeat the quest from a different point of origin until the entire situation has been examined. Burke says that in any given communication situation "... you must have some word that names the *act* (names what took place, in thought or deed), and another that names the *scene* (the background of the act, the situation in which it occurred); also, you must indicate what person or kind of person (*agent*) performed the act, what means or instruments he used (*agency*), and the *purpose*" ³⁴ ● Kenneth Burke. *A Grammar of Motives*. Prentice-Hall, Englewood Cliffs, 1945, Introduction.

From such a pentad format all the means, in endless variations, employed by people attempting to influence one another can be examined. This provides the philosophical base for his dramatic approach to language. Fogarty says, "The *pentad format* has a universality of application that makes it practical for the functions of interpretation of communication, the search for the most meaningful motivations in a symbolic utterance, and even the solving of any theoretical problem where research is possible." ³⁵ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 82.

Language is fraught with ambiguities because thought and action need not necessarily coincide. There may be either mystery or illusion or a deliberate lie in expression. Burke says that in people, "The cultural accretions made possible by the language motive become a 'second nature' with them. Here again we confront the ambiguities of substance, since symbolic communication is not a merely external instrument, but also intrinsic to men as agents. Its motivational properties characterize both 'the human situation' and what men are 'in themselves.'" ³⁶ ● Kenneth Burke. *A Grammar of Motives*. Prentice-Hall, Englewood Cliffs, 1945, p. 33.

Therefore the pentad of questions is a means of discovering ways in which the ambiguities may become co-operative in the attempt at efficacious communication.

One sees immediately that the five categories of "classical"

rhetoric are all included within the scheme of "new rhetoric;" and that expression is *wrapped up in* invention. It is futile to see symmetry in the pentad of questions when none exists, they are not co-equal. Each question merges into the other in an irregular manner.

Every communicative act must be situated in a scene. It is the area of accessibility. But the act is not separable from the scene. Burke has given the following example:

The occasion: a committee meeting.

The setting: a group of committee members bunched about a desk in an office, after hours. Not far from the desk was a railing; but despite the crowding, all the members were bunched about the desk, inside the railing. However, they had piled their hats and coats on chairs and tables outside the pale. General engrossment in the discussion. But as the discussion continued, one member quietly arose, and opened the gate in the railing. As unnoticeably as possible, she stepped outside and closed the gate. She picked up her coat, laid it across her arm, and stood waiting. A few moments later, when there was a pause in the discussion, she asked for the floor. After being recognized by the chairman, she very haltingly, in embarrassment, announced with regret that she would have to resign from the committee.

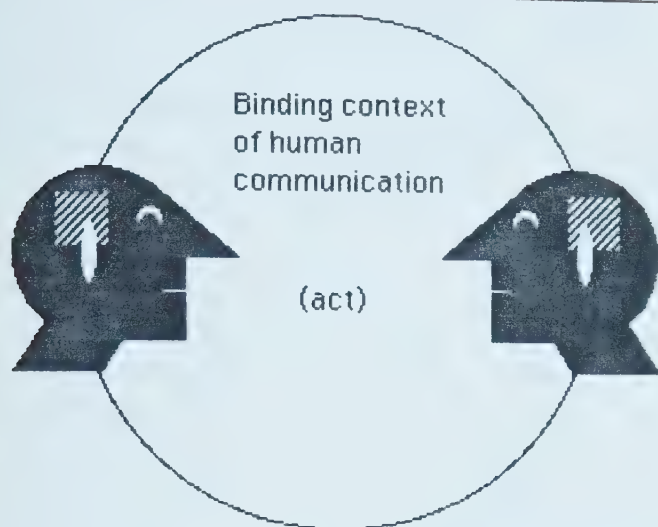
Consider with what fidelity she had set the scene for this pattern of severance as she stepped beyond the railing to make her announcement.

Design: chairman and fellow members within the pale, sitting, without hats and overcoats — she outside the pale, standing, with coat over her arm preparatory to departure. She had strategically modified the arrangement of the scene in such a way that implicitly (ambiguously) contained the quality of her act.³⁷ ● Kenneth Burke. *A Grammar of Motives*. Prentice-Hall, Englewood Cliffs, 1945, p. 11.

In graphic representation there is an attempt to organize the sign-events in a page in a similar manner; to bring various concepts into proximity within a space that implicitly contains the quality of the expression. This requires that the communication situation must be analysed and transposed into suitable signs.

K. Anderson has described a communication situation as consisting of various aspects that he calls the binding factors of communication.³⁸ ● Kenneth E. Anderson. *Persuasion Theory and Practice*. Allyn and Bacon, Boston, 1971, p. 24.

An elaboration of these aspects can be schematically shown as in figure 3. Their coincidence with the pentad format is obvious. They are the milieu of rhetoric within which analysis may be conducted and from which the making of appropriate signs may proceed.



a) Human factors (agent)

1. Needs, goals, wants
2. Knowledge, ideas, experiences
3. Values, attitudes, beliefs
4. Interests
5. Group members and roles
6. Communication abilities

b) Situation-setting factors (scene)

1. State of things generally
2. State of topic
3. Immediate contextual environment
4. Audience size
5. Availability of media
6. Interaction of other elements affecting setting
7. Public or private setting

(c) Mode factors (agency)

1. Nature of media
2. Limits on audience
 - General audience
 - Specific audience
3. Selection and interaction of signs

(d) Binding context factors (purpose)

1. Interaction of all the elements
2. Effect of time
3. Effect of the process nature of communication
4. Complexities due to the processes of the modes employed
5. Personal or communal sources

Figure 3: The Binding Context

The binding context of communication. Shown is its relationship to the pentad format of "new rhetoric".

(Adapted from Kenneth E. Anderson. *Persuasion Theory and Practice*.

Allyn and Bacon, Boston, 1971, p. 24; and David K. Berlo.

The Process of Communication. Holt, Rinehart & Winston, New York, 1960, p. 72.

3 The Phenomenon of Concept Formation

3.1 Concepts and Comprehension

In the age of "technique" the presupposition of rationalism has infiltrated the thinking of many of the specialists investigating the phenomenon of concepts, whether linguists, psychologists, philosophers, or artists. They have all been influenced by the pristine logic of mathematics because "technique" casts language in its own terms and makes it into a "science." Thus there has been an attempt to find in language a precise set of relationships, resulting in the notion that there is an ideal language.

In mathematics, for example, the single symbolic entities are not linguistic, they do not exist as a language until they form a relationship to another. The single entities make no reference to anything beyond themselves. Individual mathematical notations could as easily have been replaced by some other notation without changing the meaning.¹ ● See Gottlieb Frege, trans. by J. L. Austin *The Foundations of Arithmetic*, Philosophical Library, New York, 1950, p. 22.

Mathematics studies properties of relational sets which remain constant under various specified transformations. In this it has classification as an objective. This property is characteristic of various codes (e.g. the rules of a board game). But this is not the only nor the primary property of natural language. In using language we concentrate on the specific events rather than on averages.

Mathematics is therefore general, lacking in the capacity to deal with particulars. Furthermore, mathematics is a science of numbers having an economical consistency and clarity of sequence which is also unlike natural language.² ● See W. Karush, "On the Use of Mathematics in Behavioural Research," *Natural Language and the Computer*, ed. Paul Garvin, McGraw-Hill, New York, 1963, pp. 73ff.

In this mathematics has decided strengths but also decided limitations as a form of communication. While it can put forth arguments with the assumption of accuracy, it is bereft of any form of emotion. (With the exception, perhaps, of the emotion generated by large numbers.)

Mathematics is therefore understood to be an artificial language which abstracts from a situation certain statistical averages and organizes them into general patterns; whereas natural language concentrates on a situation, defines, zeroes in on particulars, and

thus, through word-meanings, specifies what gives the whole meaning. Mathematics and natural language are in this sense opposites. Mathematics states the universal in terms of individual formulae; natural language, through dramatizing the universal, gets to the bottom of some particular situation. Mathematics prefigures the conceptual associations and is merely the type of thought.

Where the mathematician admits of an artificial language, the linguist, the psychologist and the philosopher insist on natural language as an exact science. The founder of linguistics, Saussure, was very insistent on this point.³ ● Ferdinand de Saussure, trans. by W. Baskin. *Course in General Linguistics*. (1931) Philosophical Library, New York, 1950, p.1.

The basis for this insistence has its origin in 1725 with the publication of *The New Science* by the jurist Giambattista Vico. This work has become the fountainhead of modern linguistics.⁴ ● See Terence Hawkes. *Structuralism and Semiotics*. University of California Press, Berkeley, 1977, p.11.

The science that he proposed was, in fact, a science of language; a "science of man" he called it. He turned as a model to the natural scientists such as Bacon and Newton who were attempting to observe the structure of the universe.

To Vico it was the structure of language, springing as it does from the human mind, that became the definition and ultimately (in Behaviourism) the meaning of the very world that that same mind perceived.⁵ ● G. Vico, trans. by Thoman Goddard Bergin and Max Harold Fisch. *The New Science*. Cornell University Press, Ithica, 1968, p. 367. Vico's work represents one of the first modern recognitions of *process* as a definitive characteristic of the mind. He laid the foundation for a school of thought which moved away from understanding language as mediation. In this he is the forerunner of those modern schools of thought whose presupposition is that humans and human society are not fashioned after some model which exists before they do. In this he is like the existentialists who allow no pre-existent human essence and no pre-determined human nature. He is also like the Marxists who would have humans determined by particular social relations and systems of institution. This allows the only permanent and genuine human characteristic to be the faculty of structuring.

Therefore to the specialists the observation of the general functions and patterns of language is most important – to trace its

development and to describe its behaviour. But they never get to specific and practical acts of communication. It does not reach the human level. They create, instead, endless categories of language (structural linguistics, historical linguistics, psycho-linguistics, stylistics, etc.). This categorization of linguistics is, on first impression, very orderly and "scientific", but results in endless discussions and counter-discussions of facts that have no significance to the operations of language in real terms: at street level, one might say. Where natural scientists might profitably investigate and discuss such structures and divisions as particle physics, linguists make a mockery of language by concentrating on categorizing minute details.⁶ See E. Sapir. *Language*. Hart-Davis, London, 1949, pp. 24ff.

Therefore among all the competing factions within the disciplines there is, however, a constant thread. This is an attempt to describe what language does without reference to either what it means or to the social context which influences and conditions it. An attempt is made to focus on the "how" of language without reference to the "what" of language.

Saussure's statement, which laid the foundation for all subsequent linguistic study, states, "... the true and unique object of linguistics is language studied in and for itself."⁷ Ferdinand de Saussure, trans. by W. Baskin. *Course in General Linguistics*. (1931) Philosophical Library, New York, 1950, p. 232.

For "technique" language is no more than a number of component parts, either phonemes or their correspondent visual symbols, and their relationships. This makes for a very arbitrary world. There is no reason for making a distinction between "dog" or "hund"; no social distinction between them.⁸ Ferdinand de Saussure, trans. by W. Baskin. *Course in General Linguistics*. (1931) Philosophical Library, New York, 1950, p. 15.

The human distinctions don't count. Language is not substance but structure. It is essentially a self-referential monism described by Jean Piaget as consisting of (1) the idea of wholeness (2) the idea of transformability (3) the idea of self-regulation. It is called Structuralism.⁹ Jean Piaget, trans. and ed. by Chaninah Maschler. *Structuralism*. Routledge and Kegan Paul, London, 1971, pp. 5-16.

Hawkes says, "Accordingly, the *relationship* between observer and observed achieves a kind of primacy. It becomes the only thing that can be observed. It becomes the stuff of reality itself. Moreover the principle involved must invest the whole of reality. In consequence,

the true nature of things may be said to lie not in things themselves, but in the relationships which we construct, and then perceive, between them." ¹⁰● Terrence Hawkes. *Structuralism and Semiotics*. University of California Press, Berkeley, 1977, p. 17. My emphasis. Language according to such a mathematical view allows no transcendency; it does not point beyond itself; it is not mythic. Sapir says that he cannot believe, "... that culture and language are causally related." He continues, "Culture may be defined as *what* a society does and thinks. Language is a particular *how* of thought."

¹¹● See E. Sapir. *Language*. Hart-Davis, London, 1949, p. 233.

In mythology and in both the literary and the plastic arts the "what" and the "how" have up until the age of "technique" been conjoined providing a complete socio-linguistic context. ¹²● See Kenneth Burke. "A Dramatistic View of the Origins of Language." *Quarterly Journal of Speech* Vol. 38, pp. 256-59.

For the individual within the society it provides a "network of implication." Sapir forgets that linguistic concepts can only be worked conceptually; that there is no society apart from its conceptual locus. ¹³● See E. Sapir. *Language*. Hart-Davis, London, 1949, p. 237.

The mathematician could, presumably, reduce a piece of discourse or a poem to alpha-numerical notations, marking its logical procedures, etc. ¹⁴● See W. Karush. "On the Use of Mathematics in Behavioural Research." *Natural Language and the Computer*, ed. Paul Garvin, McGraw-Hill, New York, 1963, pp. 73ff.

But this has nothing to do with the discourse or the poem, because believability and meaning (and therefore persuasive weight) lie in the very choice of words and images. And here is the crux, *the profusion of concepts in natural language are not the dress of the discourse but are the discourse itself*. Mathematics is but an outline.

Structuralism attempts to reduce the principles to language to an outline. Hawkes says, "... it claims that the nature of every element in any given situation has no significance by itself, and in fact is *determined* by its relationship to all the other elements involved in the situation." ¹⁵● Terence Hawkes. *Structuralism and Semiotics*. University of California Press, Berkeley, 1977, p. 18. My emphasis. In structuralism no concepts come into a discourse from a pre-existent context. There is no means allowed outside of the structure whereby anything can be evaluated as meaningful; not nature; not myth. In such a narcissistic view the only value is that which is afforded by the structural relationships.

But it is impossible to use natural language without bringing about an evaluative position (by using language to communicate we assume that our communings are worthwhile) and Morawski, refutingly says, "Their [structuralists] disregard of assessment and criticism, in fact, boils down to removing them altogether from basic procedures of evaluation, not just from hierarchization of value. It is thus not the point that the semiotician leaves it to others to use the scale of the 'better-worse' type; for he or she purifies intentionally the description made from axiological assumptions; either truly or apparently, he does not realize that a description of artistic values is impossible without a valuative (normative) attitude." ¹⁶ ● Stefan Morawski. "Concerning the So-called 'Structuralist-Semiotic Esthetic,'" found in Jerzy Pelc et. al. *Sign, System and Function*. Mouton, Berlin, 1984, p. 180.

Linguistics according to the Saussurian school is very mechanistic having no means of embracing cultural subtleties and cultural norms. Great literature therefore is no means to truth. Bloomfield says, "The individual features in which the language of the great writers differs from the ordinary speech of his time and place interest the linguist no more than do the individual features of any other person's speech and much less than do the features common to all speakers." ¹⁷ ● Leonard Bloomfield. *The study of Language*. Henry Holt, New York, 1933, p. 22.

In this there are similarities between Saussurian linguistics and Behaviourism, a tenet of psychology, in which language is reduced to a merely observable action with no primacy between mental processes and meaning, meaning being an internal and submerged private process. ¹⁸ ● See Jonathan Bennett. *Linguistic Behaviour*. University of Cambridge Press, Cambridge, 1976, p. 3.

The meaning stimulus of great art, which has the ability to motivate people, is totally ignored. That great artists exist at all is of no concern. And what makes for great artists? It is the way in which concepts are used, their emotive dimension, their efficacy to perpetuate beliefs and stir actions in individuals. Efficacy *is* a quality of the conceptual stimulus.

Like Vico their forerunner of the eighteenth century, modern linguists attempt to model their methods on those of the natural sciences. But the objects under the linguists investigation are totally different in essence. Language, unlike the physical universe, does not exist in generalized standards. It exists as a vast body of

particular peculiarities. An attempt to reduce these to a system results in a set of rules incapable of dealing with the subtleties of the particularities. The rules can only deal with generalities of language; they can say nothing about that which makes language transcendent of time and place, of what makes it mythic.

Choosing to place the particularities of language into categories and devising a general system, without considering meaning and value, results in a kind of laboratory approach to human interactions where social context provides a mere abstract patterning of language behaviour. This results in the erroneous assumption that language operates equally in every utterance and every scribble. That language is ever poorly used is not considered. Lotz would put the language of exalted mysticism on the same plane as that of the drunkard.¹⁹ ● John Lotz. "Linguistic Symbols Make Man." *Psycholinguistics*, ed. S. Saporta, 1961, p. 14.

There is an artificial division forced between the "what" of language and the "how" of language.²⁰ ● See Bennet's meaning-nominalism theory. Jonathan Bennet. *Linguistic Behaviour*. Cambridge University Press, Cambridge, 1976, pp. 7-11 and pp. 272-76.

In a broader approach to the phenomenon of concepts we may observe a parallel between consciousness, language and myth. Myth is like language itself; over against it there is something else, its substance. The language master, C. S. Lewis, uses the metaphor of object and shadow to explain this. One cannot exist without the other but they are not the same thing. He says:

To explain this we must look a little closer at myth in general. . . Human intellect is incurably abstract. Pure mathematics is the type of successful thought. Yet the only realities we experience are the concrete — this pain, this pleasure, this dog, this man. While we are loving the man, bearing the pain, enjoying the pleasure, we are not intellectually apprehending Pleasure, Pain or Personality. When we begin to do so, on the other hand, the concrete realities sink to the level of mere instances or examples: we are no longer dealing with them, but with that which they exemplify. . . As thinkers we are cut off from what we think about. . . The more lucidly we think, the more we are cut off: the more deeply we enter into reality, the less we can think. You cannot *study* Pleasure in the moment of the nuptial embrace, nor repentance while repenting, nor analyse the nature of humour while roaring with laughter. . . Of this tragic dilemma myth is the partial solution. In the enjoyment of a great myth we come nearest to experiencing as a concrete what can otherwise be understood only as an abstraction. . . The moment we *state* this principle, we are admittedly back in the world of abstraction. It is only while receiving the myth as a story that you experience the principle concretely. . . What flows into you from the

myth is not truth but reality (truth is always *about* something, but reality is that *about which* truth is), and, therefore, every myth becomes the father of innumerable truths on the abstract level. . . . It is not, like truth, abstract; nor is it, like direct experience, bound to the particular.²¹ ● C. S. Lewis. *Undeceptions*. Geoffrey Bles, London, 1971, pp. 42–43.

There is complete spherical interdependence between concrete eventfulness and abstracts in linguistic conceptualization.

It has been shown that acts of language are never purely rational, but consists in the use of *logos*, *pathos*, and *ethos*, which are both psychic and visceral attributes. Lewis adds to this concept:

We were told it all long ago by Plato. As a king governs by his executive, so Reason in man must rule the mere appetites by means of the 'spirited element'. The head rules the belly through the chest — the seat, as Alanus tells us, of Magnanimity, of emotions organized by trained habit into stable sentiments. The chest — Magnanimity — Sentiment — these are the indispenible liason officers between cerebral man and visceral man. It may even be said that it is by this middle element that man is man: for by his intellect he is mere spirit and by his appetite mere animal.²² ● C. S. Lewis. *The Abolition of Man* (1943) Fount, Glasgow, 1978, p. 19. See also Plato, trans. by Sir Desmond Lee. *The Republic*. Penguin Books, Harmondsworth, 1955.

Owen Barfield concurs that the close connection between language, feeling, and thought; that the means of naming something is to possess it; and that to isolate, to describe, and to analyse something with the participation of the full weight of the emotions, is a *single* act of consciousness. In discussing Barfield's view, the following comment is made, "As an example, what we think of as a substance, a very complex physical substance — blood; the [ancient] Hebrews thought blood was the life, and therefore the word 'blood' was a way of saying livingness. One cannot distinguish between abstract things like life and a physical substance like blood."²³ ● Owen Barfield. "The Meaning of the Word 'Literal.'" in L. C. Knights and Basil Cottle, ed. *Metaphor and Symbol* Butterworths Scientific Publications, London, 1960, p. 61.

Barfield says that language originates in the physical universe which must be interpreted according to trained habit, and that "the literal and discursive use of language is the way in which it is used by a speaker. . . . that real and figurative relation between man and his environment, out of which words he is using were born and without which they could never have been born. . . . My point is that you can never start on immaterial content, unless it was given to you from

the beginning." ²⁴ ● Owen Barfield. "The Meaning of the Word 'Literal.'" in L. C. Knights and Basil Cottle, ed. *Metaphor and Symbol*. Butterworths Scientific Publications, London, 1960, p. 59. See also Max Müller. *Lectures on the Science of Language*. Longmans, Green and Co., London, 1873, esp. pp. 344ff.

This juncture, which is never precise nor definitive, is what Lewis calls myth-making. Thus the entire binding context feeds into myth. This *dynamic* connection between thought and action is the basis of what Kenneth Burke recognizes as the dramatistic view of language – a development from the "middle element." ²⁵ ● Kenneth Burke. "A Dramatistic View of the Origins of Language." *Quarterly Journal of Speech*. Vol. 38, pp. 256-59.

At bottom, language operates by always pointing away from itself, by referring to something else. Language *is* concepts and the context of consciousness.

Like the linguists, the psychologists studying the phenomenon of concepts, according to B. F. Skinner, are not interested in context.

They are interested in units of behaviour. ²⁶ ● B. F. Skinner. *Verbal Behavior*. Appleton-Century-Crofts, New York, 1957, pp. 35ff.

He defines the basis of language as a series of conditions. He would deprive both language and behaviour of meaning. ²⁷ ● B. F. Skinner.

Verbal Behavior. Appleton-Century-Crofts, New York, 1957, p. 10.

To him there is no functional difference between the word "water", for example, and the act of a thirsty person asking for a tumbler-full. While it is true that the concept "water" conditions the action of a thirsty individual, it is the reduction of the concept to a mere function that is to be refuted. Had the concept been misunderstood the tumbler-full would not have been forthcoming. The concept is loaded with both cultural and immediate contextual import. It is inherently meaningful.

J. B. Watson has stated, "We watch what the animal or human being is doing. He means what he does. It is foolish to ask him while he is acting what he is meaning. His action is the meaning. Hence exhaust the concept of action and we have exhausted the concept of meaning." ²⁸ ● J. B. Watson. "Is Thinking Merely the Action of Language Mechanism?" *British Journal of Psychology*, Volume 11, 1920, p. 14.

Is this possible? If notions such as considering, knowing, and feeling, etc. are rejected, and if all words are reduced to noises which only by association are linked with action, then why should the comments of the Behaviourists themselves be of importance to anyone? R. L. Gregory has stated that this is paradoxical and self-defeating. ²⁹ ● R. L. Gregory. *Concepts and Mechanisms of Perception*.

Duckworth, London, 1974, Pretext. While some researchers attempt to move beyond Behaviourism, Leonard Krasner has observed that the pattern established by Skinner, which is followed in much of the psychological experimentation with language, is only superficially different from Behaviourism. The examiners attempt to bring the independent variables under their control in the process of arriving at definitions of verbal behaviour, which is in a sense opposite to what the artist does. In doing so, where it attempts to move away from the narrowness and restrictiveness of Behaviourism, it moves towards pure mathematics.³⁰ • Leonard Krasner. "Studies of the Conditioning of Verbal Behaviour," *Psychological Bulletin*, Volume 55, 1958, pp. 148-70.

This kind of thinking results in a very low estimation of man.³¹ • Watson refers to himself as a complex of reacting systems. J. B. Watson. "Is Thinking Merely the Action of Language Mechanism?" *British Journal of Psychology*, Volume 11, 1920, p. 94.

Thus Positivists would add that if the mystic admits that the object of his vision is something which cannot be described, then he must also admit that in mentioning it he utters nonsense.³² • A. J. Ayer. *Language Truth and Logic*. (1936) Penguin Books Ltd., Harmondsworth, 1983, pp. 150-58.

There is a denial of the value of the individual human being insofar as "what he is in himself;" of his stable sentiment; and of speech, writing, art, and the richness of human activities. It would reduce the noble language of Schiller and Shakespeare to nonsense, making it no more than the chance arrangement of tokens. And it leaves us without the means of understanding the works of mystics like Blake.

Where language consists largely in a "reading between the lines" and in non-rational emotive factors in addition to the facts referred to, these characteristics cannot easily be categorized, even in Content Analysis with its vast system of categories.³³ • I. de Sola Pool. "Trends in Content Analysis," *Psycholinguistics*, ed. by S. Saporta, University of Illinois Press, Urbana, 1955, pp. 189-233.

And Carney admits, "Some texts involve factual descriptive writing. Others contain subtle allusions with many levels of meaning. A content analysis can be only as objective as these constraints allow. But the technique provides a multitude of methods for keeping subjectivity and impressionism under varying degrees of control. . . ."

³⁴ • T. F. Carney. *Content Analysis*. University of Manitoba Press, Winnipeg, 1972, p. 44.

One is struck by the fact that the methodology used is imposing upon the rich and variegated texture of human linguistic reality a bias of its own. The statistical data accrued by the method of describing influence the very thing under investigation.³⁵ • G. A. Miller. *Language*

and *Communication*. McGraw-Hill, New York, 1951, p. 95.

Such a discussion of language, treating it as though it were a code, like a board game is a code, is very lopsided. It is "technique." This is evidenced by the way in which Cherry describes the information content of a communication signal as a *property* of the signal.³⁶ ● C. Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, pp. 7 and 9. This implies that the business of "getting across" the message more efficiently is of greater significance than its truthfulness or value in human terms.³⁷ ● C. Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 226, and Yehoshua Bar-Hillel and Rudolph Carnap. "Semantic Information," *Communication Theory*, ed. by Willis Jackson, 1953, p. 503.

Where a broader view of the phenomenon of concepts distinguishes between motion (non-symbol-using animal acts) and action (symbol-using human acts), viewed from the position of "technique" it does not. Where symbol-use exists there is always purposive, emotive, and motivational action which is multi-directional and complex and unsystematic.³⁸ ● See Kenneth Burke. *A Rhetoric of Motives*. George Braziller, Inc., New York, 1950, Introduction.

Where the artist, for example, is able to, with great freedom, examine specific effects of concepts, the linguist or psychologist, if they are to be consistent, must abide by the systems they have created.³⁹ ● B. F. Skinner. *Verbal Behavior*. Appleton-Century-Crofts, New York, 1957, pp. 239ff.

With the clumsy categories or units of behaviour they are unable to approach, except with great difficulty and even after much struggle only superficially, a complex communicative act like a discourse, a poem, or a picture – to get at its breadth and depth of meaning.

The phenomenon of concepts in natural language is not systematic, it is cumulative. And there is no homogeneity. There is a conflict of ambiguities; a balancing of concepts that yields a richness which we sometimes call art. It is not a process of behavioural categories, but consists of dense multi-layered emotive and motivational concepts. In the pursuit of the rational, an important human factor is omitted. A theory of concepts based on mathematics would slough off everything that might make a discourse meaningful through texture and timbre, the symbolisms and feelings of words and images, and would translate it into a more rational and concise kind of language based on the relationships of notations.

Fundamental to the nature of the phenomenon of concepts is a

conative attitude. It is a basic desiring or willing, from which everything else emerges as action. We thus possess a spirit of creative intellectual (purposive) freedom whereby we participate in the phenomenal world. Through it mind is able to meet mind.⁴⁰ See Kenneth Burke, *A Rhetoric of Motives*. George Braziller, Inc., New York, 1950, Introduction, and J. Drever, *Instinct in Man*. Cambridge University Press, Cambridge, 1921, pp. 130ff.

Mitchell Ginsberg, in discussing how we come to hold certain beliefs about human nature, says that through describing, "... as language-possessing individuals of a society, we have in addition to the native speaker's grasp of his language, certain assumptions about various phenomena. Among these is that of human behavior. In expressing the most firmly accepted or central of these assumptions, the deepest-embedded of these, we present philosophical reflections on these phenomena."⁴¹ Mitchell Ginsberg, *Mind and Belief*. Humanities Press, Inc., New York, 1972, p. 21.

This implies that there is a mental process whereby we are capable of, and hence do, devise beliefs which are based on the referential truth of language.

On this assumption James Drever speaks of meaning as having two parts: a primary and a secondary component. Primary meaning is the *feeling of relation* between an object or situation and the impulse towards it. It is a sub-conscious and pre-linguistic impulse.

⁴² See J. Drever, *Instinct in Man*. Cambridge University Press, Cambridge, 1921, pp. 130ff.

In order for the object to have meaning there must be a reference that is not in the object but in the individual. F. Bartlett defines the entire cognitive process as a thrust for meaning, which is at all times being satisfied by the myth made up of the phenomenal world.⁴³ Frederic C. Bartlett, *Remembering*. Cambridge University Press, Cambridge, 1932, p. 227.

Primary meaning is thus purely affective and motivational: towards need, purpose, and aim (hence it is pre-linguistic experience). This conative faculty makes it immediately mythopoeic. It is the pro-existent impulse in sentient and conscious humanity. Secondary meaning is derived from primary meaning. It is built from the process of projecting present pre-linguistic experience into the future and is both affective (as a mental process) and pragmatic (as a social communicative act).⁴⁴ See J. Drever, *Instinct in Man*. Cambridge University Press, Cambridge, 1921, esp. pp. 130-49, 257-59.

We can make valid assumptions and hold beliefs based on this

two-fold cognitive process.

R. B. Brandt and J. Kim hold that as a person learns to speak ordinary language the speaker accepts a certain theory of human behaviour and the environment that surrounds us. This theory "... can be viewed as a small-scale psychological theory which is implicitly embedded in our everyday understanding of events or processes involving wanting, feelings of joy and disappointment, and the like." ⁴⁵ R. B. Brandt and J. Kim. "Wants as Explanations of Actions," *Journal of Philosophy*, Vol. 60 (1963), 425-434.

We come to believe certain things about things through observation and description springing from conation. This process is equally internal (consciousness) and external to the individual (linguistic indication of consciousness). We constantly elaborate on beliefs which in turn generate new beliefs, drawing the old beliefs up into a higher plane of knowing without negating earlier ones (as purely logical reasoning might). This is the conative mythic process of history knowable only via linguistic conceptualizations.

On this view we can see through a myth to something else which is not myth (knowledge and belief) and can gain some understanding about that which we actually experience through this mythico-linguistic phenomenon. We get many abstractions, which are infused into our minds' systems of knowledge and belief. Our minds are mythopoeic. The reality of community is that about which truth is, which is accessible through the reality of myth; an object and shadow relationship. In this myth transcends thought and is the locus of language. And appeal can be made to our sense of well-being, our sense of belonging, which are non-rational impulses, and yet not contravene reason. (Aristotle's thesis.)

Furthermore, because they are intimately contained in our being, beliefs are constantly in relation to actual existential states as experienced by individuals. They are manifest in our expressions of wants, needs, joys, etc. and help maintain an equilibrium in people's lives. They are worked out in society as interpersonal relationships. A communicator is in constant search for those entities which contribute to this state of social equilibrium to work into the content of his work. This implies that the content must contain something to which the perceiver can respond utilizing both rational and non-rational faculties if the work is to meet human need and match human temperament and disposition. ⁴⁶ See C. S. Lewis. *Studies in Words*. Cambridge University Press, Cambridge, 1960, pp. 314-15.

We do well to remember what William James says about completeness in the individual.

It is notorious that facts are compatible with opposite emotional comments, since the same fact will inspire entirely different feelings in different persons, and at different times in the same person; and there is no rationally deductible connection between any outer fact and the sentiments it may happen to provoke. These have their source in another sphere of existence altogether, in the animal and spiritual region of the subject's being. Conceive yourself, if possible, suddenly stripped of all the emotion with which your world now inspires you, and try to imagine it *as it exists*, purely by itself, without your favorable or unfavorable, hopeful or apprehensive comment. It will be almost impossible for you to realize such a condition of negativity and deadness. No one portion of the universe would then have importance beyond another; and the whole collection its things and series of its events would be without significance, character, expression, or perspective. Whatever of value, interest, or meaning our respective worlds may appear endowed with are thus pure gifts of the spectator's mind. . . . Meanwhile the practically real world for each one of us, the effective world of the individual, is the compound world, the physical facts and emotional values in indistinguishable combinations. Withdraw or pervert either factor of this complex resultant, and the kind of experience we call pathological ensues.⁴⁷ William James. *The Varieties of Religious Experience*. Macmillan Publishing Co., Inc., New York, 1961, 130-131.

Thus the concept of conation in the meaning process is fundamental to any theory of communication, which necessarily deals with human motivation and interaction in society. The conative bond between mental processes and environmental social processes is indivisible. The linguistic conceptualizations that the mental process imparts are multi-directional and are in a constant state of fluctuation in the existential states: between objects or events; between words; between pictures; between objects or events, words, and pictures. The mental process yields linguistic structuring which affords meaning and confirms the pre-linguistic "feeling of relation" toward the "external" environment. The apprehension of an image and its comprehension resulting in meaning can "never get away from concrete life, or work in a conceptual vacuum."⁴⁸ William James. *Varieties of Religious Experience*. Macmillan Publishing Company, Inc., 1961, p. 356.

Meaning is, therefore, entirely contingent on a tri-part relationship between (1) a mental process (which is a feeling of relation toward an object or event, *and* a structured concept dependent on the object or event, and its perceived formulation), (2)

objects or events, and (3) resulting in both mental and physical action. This relationship can be shown schematically as in figure 4. But this is not to be construed as the *definition* of meaning, which lies wholly in how it manifests itself in the ranges of conceptual associations whereby people live – myth. Concepts have no existence apart from life.

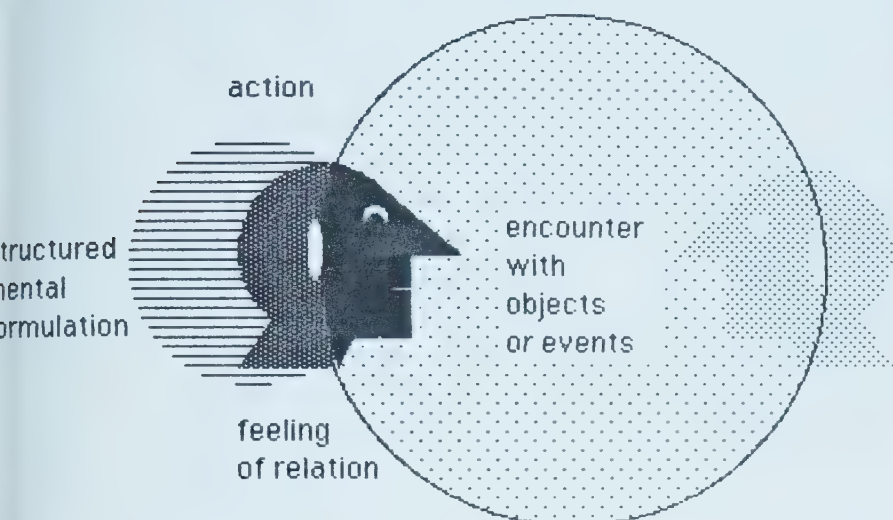


Figure 4: The Meaning Process

A schematic arrangement of the meaning process. The feeling of relation is satisfied by things entering from the outside objective and eventful world. These are in turn given mental structure in the process of determining meaning.

3.2 Concept Processing

Just as there is no consensus among language specialists about what language is, there is no consensus about what meaning is. In this century, as the fields of scholarship have focused on the areas of conceptual organization or relational processes, resulting in the definition of relationships between and among parts and wholes, the problem of meaning has become insurmountable. When the whole is lost sight of among the parts; when how the relationships ultimately function in the makeup of consciousness is left perpetually unresolved, the recognition of meaning is no longer possible and an intellectual impasse results. But the impasse is not as final as might be supposed. There is not a radical disjuncture between the rational and the non-rational if language is viewed as a holism and we embrace the view of interdependence in human psychic and visceral attributes.

It will not do, as some modern scholars have seriously suggested, that we abandon the term altogether, in an attempt to avoid the profusion of one-to-many linguistic conceptual associations.⁴⁹ ● J. B. Watson. *Behaviorism*. Norton, New York, 1925, 200-201; Charles Morris. "Foundation of the Theory of Signs," *Foundations of the Unity of Science*. Vol. 1, No. 2, University of Chicago Press, Chicago, 1938, p. 43; C. Cherry. *On Human Communication*. Science Editions, New York, 1961, p.114.

Nor can we sidestep the issue by musing about the elusiveness of meaning.⁵⁰ ● Creelman describes meaning as being as elusive as Cinderella and scholars as her suitors. ● Marjorie B. Creelman. *The Experimental Investigation of Meaning*. Springer, New York, 1966, p. 207.

The word is among the commonest in the language according to a standard word usage count conducted by Thorndike and Lorge in 1959,⁵¹ ● E. L. Thorndike and I. Lorge. *The Teacher's Word Book of 30,000 Words*. Teacher's College (Bureau of Publications), Columbia University, New York, 1959.

and it would be impossible to communicate if we misconstrued the concept when someone says, "But I mean . . ." The concept is absolutely taken for granted in everyday usage. Yet Morris insists that "the term has had such a notorious history, [that] theoretically, it can be dispensed with entirely."⁵² ● Charles Morris. "Foundation of the theory of signs," *Foundations of the Unity of Science*. Vol. 1, No. 2, University of Chicago Press, Chicago, 1938, p. 43.

However the notion remains at once all-encompassing and inescapable.

The traditional approach to meaning is from the perspective of the theologian and philosopher centring in the notion of "idea" with elaborations such as context, purpose and direction, having the reference point always lying within the consciousness of the individual. This focuses the definition within the bounds of the content of experience but points away from the self to that which is not the self – myth.

George Mead admits that the outworking of meaning lies in the communicative acts of individuals, but he misses the point completely in disallowing consciousness. He says:

Much subtlety has been wasted on the problem of the meaning of meaning. It is not necessary, in attempting to solve this problem, to have recourse to psychical states, for the nature of meaning... is found to be implicit in the structure of the social act, implicit in the relations among its three basic individual components: namely, in the triadic relation of a gesture of one individual, a response to that gesture by a second individual, and completion of the social act initiated by the gesture.⁵³ Quoted by A. Straus (ed.), *George Herbert Mead on Social Psychology*, University of Chicago Press, Chicago, 1964, p. 169.

It is easy to see that such an understanding comes about because of an unwillingness to recognize the importance of conation in the state of consciousness and transcendence in language. It is a materialist view. Philosophers have also supported this view. Signification Theory has made a strong distinction between the outward appearances of language and the things referred to. The terms sign, signifier, and signified, are inadequate for a full description of concepts. According to this theory a thing designated to represent some concept; to become a sign; is emptied of whatever meaning it originally might have possessed before the designation was made. Once designated the sign is filled with meaning only in light of the new association. That is its significance. Granted, all previous associations of the signifier are subject to the current one, but it is nihilistic to assume that the strong light of this association overpowers and casts all previous meanings into the deep shade of insignificance.⁵⁴ See Roland Barthes, trans. by Annette Lavers, *Mythologies*, Paladin, London, 1973, pp. 124-25. This theory gives insufficient emphasis to the fact that every such designation is a conceptual event, rhetorically formed, intentionally motivated, and emotionally charged. It too is concerned with

categories. It attempts to codify everything: logical codes (semaphores, directional sign systems, morse code, games, etc.), social codes (ritual, protocol, fashion, etc.), and aesthetic codes (symbolism, myth, religion, morphology – the arts and especially “new criticism” which “considers these facts as structured systems and borrows its model from linguistics,” etc.).⁵⁵ ● Pierre Guiraud, trans. by George Gross. *Semiology*. Routledge & Kegan Paul, London, 1971, Foreword and p. 77.

Instead of myth being the locus of consciousness Signification Theory attempts to make it one of the categories of significance. It is a theory of pure materialism. Hawkes says, “This will finally involve what Frederic Jameson has described as ‘an explicit search for the permanent structures of the mind itself, the organizational categories and forms through which the mind is able to experience the world, or to organize a meaning in what is essentially in itself meaningless.’ The ghost of Vico clearly remains unplaced.”⁵⁶ ● Terrence Hawkes. *Structuralism and Semiotics*. University of California Press, Berkeley, 1977, p. 18.

Burke contends that, “If you trail language back far enough, of course, you will find that all our terms for ‘spiritual’ states were mytonymic in origin. We think of ‘the emotions,’ for instance, as applying solely to the realm of consciousness, yet obviously the word is rooted in the most ‘materialistic’ term of all, ‘motion’ (a key strategy in Western materialism has been the reduction of ‘consciousness’ to ‘motion’).”⁵⁷ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkeley, 1969, p. 506.

A materialist view sees an evaluative nature as being inherent in works of art, instead of in the consciousness of the maker. Morris says, “. . . the value it designates is embodied in the work itself, so that in perceiving a work of art one perceives directly a value structure and need not be concerned with other objects which the aesthetic sign might denote (technically, other denotata than the sign vehicle itself).”⁵⁸ ● Charles Morris. “Science, Art and Technology”, *Kenyon Review*. Volume 1, 1939, p. 415.

A work of art is then simply that which it signifies within itself. Language in general is then an elaborate code within a material universe,⁵⁹ ● In a philosophy of naturalism the phenomenal world becomes a “clockwork universe” in which the mythic becomes a part of the works and mythopoeic mind occupies a corner of the body. The clock, once wound, is a closed causal series of phenomena. According to the eighteenth century philosopher, Julien Offrey de La Mettrie, that that something which myth is about is of any consequence, is reduced to “a theoretical truth with little

practical value." There is no transcendence in naturalism. See Julien de La Mettrie, ed. by Norman L. Torrey. "Man a Machine" (1747) in *Les Philosophes*. Capricorn Books, New York, 1960, p. 176.

whereas an holistic view of the phenomenon of concepts has as its primary characteristic the cumulative effect of language; a fecundity of concepts resulting in the pervasiveness and universality of myth.

⁶⁰ ● While Barthes deals with myth it is from within the model of his theory. He does not believe there to be universal myth, only universal structuring. This is in contradistinction to the definition of myth from a natural language point of view. Compare Roland Barthes. *Mythologies*. Paladin, London, 1973, pp. 109ff. with C. S. Lewis. *The Abolition of Man*. (1943) Fount, Glasgow, 1978, pp. 34ff. Lewis argues that it is precisely the streaming into human consciousness, irrespective of time and place, certain views of man and his relation to that which is not man via the conjunction of cerebral and visceral attributes that constitutes myth. There is the apprehension of something larger than the structure.

Assuming a material monism, Morris also gives great emphasis to the different forms of discourse (e.g. artistic vs. scientific). ⁶¹ ● Charles Morris. "Science, Art and Technology", *Kenyon Review*. Volume 2, 1940, p. 410.

On this assumption Ogden and Richards have attempted to distinguish differences in the concept of meaning in language when it is used for different kinds of discourse. ⁶² ● C. K. Ogden and I. A. Richards. *The Meaning of Meaning* Harcourt, Brace and Co., New York, 1948, p. 197.

Such a concentration on the differences between various discourses has had an unfortunate effect. Not only has it separated the language of art from the language of science, but it has given the appearance that referential truth lies solely within the province of science. ⁶³ ● Charles Morris. "Science, Art and Technology", *Kenyon Review*. Volume 2, 1940, p. 412.

Philosophers, attempting to create a unified empirical language, concerned with documenting observations, have attempted to free themselves from the ambiguities of natural language. In doing so they have assumed that it also be possible to include in their system of categories all language, including the ambiguous from which they hope to freed. It attempts to bring the human factors *into* the sphere of its own systematization. Neurath says it will "deal with the problems of systematization in special sciences and in unified science — including . . . educational implications of the scientific attitude." ⁶⁴ ● Otto Neurath. "Unified Science as Encyclopedic Integration", *International Encyclopedia of Unified Science*, Otto Neurath et al, ed., Volume 1, 1938, p. 24.

They fall in with the scientists who have attempted to eliminate ambiguity in conceptual associations. They attempt to assign *a* meaning to *a* word.⁶⁵ ● See Gustaf Stern. *Meaning and Change of Meaning*. Indiana University Press, Bloomington, 1931, pp. 23, 155, 147; see also Max Eastman. *The Literary Mind*. Scribner's Sons, New York, 1931, p. 255.

This, however, is based on a misconception about what concepts are and how they are associated with one another. There are no "mere ideas." There is no "mere description."⁶⁶ ● Psychologists, investigating semantic differentiations, engage in the practice of attempting to wrest words from their normal indeterminate contexts and restricting them to the experiment, forgetting that the experiment itself conditions the meaning of the words.⁶⁷ ● See C. Osgood, G. Suci and P. Tannenbaum. *The Measurement of Meaning*. University of Illinois Press, Urbana, 1957, pp. 31 ff. Words condition their contexts and visa versa. Words are not tied down to any given definition. The dictionary does not define words. It provides a range of conceptual associations. There are varying degrees of emphasis in words, governed by their contexts.⁶⁸ ● See Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, pp. 60-61 for a discussion of ideas concerning the multiplicity of meaning in the phenomenon of concepts.

The scientific view has had widespread effects. While in separating natural language from mathematics, which is desirable, it has given the aesthetic and mythic nature of art a *special* focus yielding the Independence Theory, in which the emotive character of expression, based on its allusive and sensory nature, is seen to be completely *separable* from its referential nature.⁶⁹ ● Philip Hobsbaum. *A Theory of Communication*. MacMillan, London, 1970, pp. 202-3.

Barfield, in opposition to a scientific view, has pointed out that language has come to be divided into *independent* emotive and referential components while there is in its actual existence and use no such independence. It has come about by a mechanistic view of existence in general.

Language is the storehouse of imagination; it cannot continue to be itself without performing its function. But its function is, to mediate transition from the undividualized, dreaming spirit that carried the infancy of the world to the individualized human spirit, which has the future in its charge. If therefore they succeed in expunging from language all the substance of its past, in which it is naturally so rich, and finally converting it into the species of algebra that is best adapted to the uses of indoctrination and empirical science, a long and important step forward will have been taken in the selfless cause of liquidation of the human spirit.⁷⁰ ● Owen Barfield. *Poetic Diction: A Study in Meaning*. Wesleyan University Press, Middletown, 1973, p. 23.

The mind and language are indivisible, as well as mind and body.⁷¹●

See Gilbert Ryle. *The Concept of Mind*. Hutchinson, New York, 1950.

For example, a word like design has a meaning covering a wide variety of specific events. But it is superfluous to ask where and when these meanings occur. They occur in the actions that warrant the word and it would be illusory to assume that there is a thing called "design" occupying its own autonomous world. The word "mind" is just like that. Modern man has entertained that mind is a something in itself, distinguishable from the body,⁷²● Douglas R. Hofstadter. *Gödel, Escher, Bach*. Vintage Books, New York, 1980, pp. 661-62 and 691-719.

as Ryle puts it, "the ghost in the machine" which is, "an illusion based on a confusion arising from men's misunderstanding of the 'rules' of the very language which they themselves have made."⁷³● Owen Barfield. *Poetic Diction: A Study in Meaning*. Wesleyan University Press, Middletown, 1973, p. 20.

The acceptance of linguistic dualism by the artistic community indicates the degree to which "technique" has invaded the whole of our thinking. In the literary arts there are those who, on the dualistic presumption, are concerned primarily with the "hypnotic" effect of artistic language, as in poetic distinctiveness from prose.⁷⁴● Christine Brook-Rose. *A Grammar of Metaphor*. Secker and Warburg, 1958, p. 287ff.

They recognize a distinction of two kinds of language based on the degree of *referential weight*, (Morris's thesis of scientific vs. artistic language), with the division falling along the line of poetry being less weighty than prose. Winnifred Nowotny sees poetic language as having an existence piggy-backed onto a ground-plan of prose.⁷⁵● Winnifred Nowotny. *The Language Poets Use*. Athlone Press, London, 1962, pp. 72ff.

Poetry, in her view, contains something in *addition* to ordinary language. "In ordinary discourse we expect that the discourse will hang together in one main way; that what it means as a whole will come to us if we see its ground-plan. But in [the] poem the ground-plan is only one element in a larger organization, a larger organization by virtue of which we derive from the poem as a whole a verbal experience *more exiting than, and not reducible to, a* reiteration of a common idea . . ." ⁷⁶● Winnifred Nowotny. *The Language Poets Use*. Athlone Press, London, 1962, pp. 82-83. My emphasis. What poetry offers in addition to prose is, in her final analysis, left in the area of special poetic experience and "... the final question must

be the difficult one of why the infinitely diverse relations that may obtain in poems between the total meaning and the elements that carry it, should have the common factor of exciting in us a kind of interest that we recognize as specifically poetic experience . . ." ⁷⁷● Winnifred Nowotny. *The Language Poets Use*. Athlone Press, London, 1962, p. 220.

She dissociates referential truth in her definition of poetry in favour of a special "poetic form." This view supposes referential truth to be "scientific" and emotive truth to be a higher level "artistic" form but clearly not as truthful as science, the individual whose expression lies in this higher category is the supposed artistic genius.

In the plastic arts this independence of emotive and referential factors is evidenced by the attention given to and value placed on the idea of the unique during the age of "technique." Faulkner and Ziegfeld say, "Each artist of stature is an individualist whose paintings have unique qualities. Usually, however, the works of a number of artists contemporary with one another have a great deal in common, because artists tend to work on the general problems current in their time." ⁷⁸● Ray Faulkner and Edwin Ziegfeld. *Art Today*. Holt, Rinehart, and Winston, Inc., New York, 1969, p. 430.

The "isms" of art.

What we are left with is an emotive use of concepts assigned to the arts to evoke feelings and sensations, and separate referential and factual concepts for definitive statements as in science. *The weakness lies in that it takes no account of the referential and factual content of art*. This has left imaginative fancy as a pale shadow in the supposed solidity of the facticity of scientific reference. *The result is two ways of knowing: through aesthetic form in artistic expression and referential content through scientific expression; and form in the arts has become inferior to the content of science, which, according to contemporary philosophy, is the only truth.* ⁷⁹● The application of science to the phenomenon of concepts has thus yielded its own metaphysic — art. Ellul says, "Rational man has not been able to adhere to his rationality. In the end, the world is revealed to have a number of false bottoms. The more man penetrates into himself the more he is led to question the systematic certitude so painfully acquired during the nineteenth century. . . . We have witnessed the exasperated search for universal communions, from surrealism to jazz to eroticism." ⁸⁰● Jacques Ellul, trans. by C. Edward Hopkins. *The New Demons*. Seabury Press, New York, 1975, p. 65. Sheer fancy is, however, sometimes brought into service of the factual as a special emotive necessity. ⁸¹● I. A. Richards. *Science and Poetry*. Kegan Paul, Trench, Trubner and Co., 1926, pp. 56-58.

Generally speaking, any theory of language must be holistic. It must be at once meaningful (semantic), contextual, and socially oriented. If it is not it will provide an inadequate basis for determining the meaning and value of specific acts of communication. For the communicator it is these that precisely need most to be determined.

When someone sets out to create a communicative image, it is embarked on from an evaluative premise. In the end the interpretation and evaluation of the communicative act are two sides of the same process. Every difference in the value in communication is, at bottom, a difference of interpretation. Whenever we say that a particular piece of design is good or bad, we also make an implicit response to what it is about. The very act of interpretation, of formulating linguistic concepts, presupposes that the work in question has attributes that can be interpreted.

It follows, however, that not all pieces are equally interpretable. The quality of interpretation depends on the quality of the design. But what does this depend on? What makes visible marks efficacious? It is the expression of concepts. And for the expression all we have to point to are the marks on the page (syntax). The perceiver is engaged in an act of re-creating concepts when confronted by the work. Thus we can speak of the work as having coherence or incoherence; we evaluate it conceptually. Such concepts speak loudly about the nature of the phenomenon of concepts; that comprehension attempts to maintain a unity. Incoherence is always qualitatively less than coherence. There is in concepts and comprehension a balance of rational and non-rational factors. There is no either/or situation. Meaning is to be found in what people express or make; it is therefore to be looked for in that dimension of the mind where it touches action. The physicality of expression points to something in consciousness. Susan Langer says, "This detachment from actuality, the 'otherness' that gives even a bona fide product like a building or a vase some aura of illusion, is a crucial factor, indicative of the very nature of art."⁸² ● Susanne Langer. *Feeling and Form*. Charles Scribner's Sons, New York, 1953, p. 46.

In a technological society such as ours there is a *tendency* towards a radical disjunction between man and "not man" to the point of seeing objects merely as objects without subject; without quality; without bearing in consciousness. Thus in a dark wood, trees must, above all else, remain trees lest something else bearing a quality akin to "consciousness" makes itself manifest. We are in a

state of resisting "participation in" or awareness of a certain quality behind the phenomenal world; a quality "of the same nature of the perceiving self, inasmuch as it is not mechanical or accidental, but psychic and voluntary."⁸³ ● Owen Barfield. *Saving the Appearances*. Faber and Faber, London, 1957, p. 42.

Technological man lives in an unparticipated universe. The things he makes to express himself he sees as self-contained and self-defining. Ellul says:

Work had once been filled with those secret things, with those hidden participations in a unitary world from which one snatched a fragment and became a Prometheus in so doing. Now, by contrast, work is a process of the global seizure of a world which, the more it is worked the more it is robbed of its depths. In this way man is experiencing desacralization. He is quite prepared to listen to and accept the message of pure rationalism, the demonstration that profanation is a good representing progress. . . . Thus man today relates to a world which is clear, simple, and explicable. . . . It is a world transformed into an object from which man thinks to withdraw himself so as better to act upon it. He expels it in order to control it. He isolates himself from it in order to calculate its techniques.⁸⁴ ● Jacques Ellul, trans. by C. Edward Hopkins. *The New Demons*. Seabury Press, New York, 1975, p. 65.

We have, according to Barfield, lost sight of "the far side of appearances." Where once something came in as spirit from participation, we today attempt to confine the spirit within ourselves. The "psychic and voluntary" agents behind phenomena have no true existence such as they had in a participated world.

Yet consciousness is that for which man is most fitted and for which he most longs.⁸⁵ ● See C. S. Lewis. *The Problem of Pain*. Collins, Glasgow, 1940, pp. 117-126.

Consciousness exists between two extremes. Barfield says that on the one hand "what is real is that inner world of consciousness, into which his sages could sink themselves in meditation. Spirit is reality, matter non-existent."⁸⁶ ● Owen Barfield. *Romanticism Comes of Age*. Wesleyan University Press, Middletown, 1966, p. 41.

On the other hand "there are millions of men who take it for granted to-day that matter is the only reality and spirit is – an illusion, a nothing. Everything included under the term Religion, Art, Culture and the like, is no more than an 'ideology' – a pale flickering reflection of purely physical and economic processes."⁸⁷ ● Owen Barfield. *Romanticism Comes of Age*. Wesleyan University Press, Middletown, 1966, p. 41.

Between these two poles every individual mind oscillates and every

society seeks to define itself. Full consciousness comes with a realization of a sense of subjective/objective distinctions. There is a sense of "I" awareness which must necessarily be balanced with an awareness of the "I" both *within* and *distinct from* what is not itself if either an individual or a community is to exist. History, including of course the development of the various theories about the phenomenon of concepts, is made up of differing attitudes towards this balance – myth.

Consciousness and objective being are two sides of the same coin; that is, there is a unity of intelligence and nature;⁸⁸ ● For a discussion of the senses of this word, see C. S. Lewis. "Nature," *Studies in Words*. Cambridge University Press, Cambridge, 1960, pp. 24-74. the two are, therefore, independent albeit interdependent.⁸⁹ ● For a discussion of, what Owen Barfield called "original participation" of mind and matter, see Owen Barfield. *Saving the Appearances*. Faber and Faber, London, 1957, esp. ch. 4.

In observing the drama of human expression, Burke has outlined a fundamenatal principle. He says whether the world is "mind" or "matter" or both does not affect certain operations – things like setting a fire or batting a ball. They constitute mere motions. They are not substantial. They are only correlations of chemical and physical operations, even though the discovery of their principles are rooted in metaphysic and alchemic beliefs. He says, "The limits of science, *qua* science, do not go beyond the statement that, when certain conditions are met, certain new conditions may be expected to follow."⁹⁰ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkeley, 1969, pp. 505.

But in the area of human interaction, correlation is not enough. The "is-ness" of "being" and "knowing" demands acknowledgement. Burke calls this the "poetic realism" of human communication, which is never merely correlative nor independent but interactive and substantial (as opposed to "scientific realism" which is never substantial but only correlative and the Independence Theory which is only emotive). His "Poetic realism" is always a substance of mind. He says:

Language develops by metaphorical extension, in borrowing words from the realm of the corporeal, visible, tangible and applying them by analogy to the realm of the incorporeal, invisible, intangible; then in the course of time, the original corporeal reference is forgotten, and only the incorporeal, metaphorical extension survives (often because the very conditions of living that remind one of the corporeal reference have so altered that cross

reference no longer exists with near the same degree of apparentness in the "objective situation" itself); and finally, poets regain the original relation, in reverse, by a "metaphorical extension" back from the intangible into a tangible equivalent (the first "carrying-over" from the material to the spiritual being compensated by a second "carrying-over" from the spiritual back into the material); and this "archaizing" device we call "metonymy."

"Metonymy" is a device of "poetic realism" — but its partner, "reduction," is a device of "scientific realism." Here "poetry" and "behaviourism" meet. For the poet spontaneously knows that "beauty *is* as beauty *does*" (that the "state" must be "embodied" in an actualization). He knows that human relations require actions, which are *dramatizations*, and that the essential medium of drama is the posturing, tonalizing body placed in a material scene. He knows that "shame," for instance, is not merely a "state," but a movement of the eye, a color of the cheek, a certain quality of the voice and set of muscles; he knows this as "behavioristically" as the formal scientific behaviorist who would "reduce" the state itself to these corresponding bodily equivalents.⁹¹ • Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkeley, 1969, p. 506.

Consciousness and objective being are seen to be distinguishable but not divisible — two forces in one nature — one substance. We have man and "not man;" which is both man and environment, and man as *imago dei*. There is an awareness of "up" and "down" in the mythico-linguistic consciousness. There is also, through memory and imagination, an awareness of "backward" and "forward."

It is only because of this awareness that we are linguistic and can engage in the art of rhetoric at all. It is only within the general state of being, in our awareness of a relation to other kindred spirits (in the sense of *delectare*), that we can be stirred (*movere*) and be made tractable (*docere*). It is at once rational and non-rational. Burke continues:

He [the artist] also knows, however, that these bodily equivalents are but part of the *idiom of expression* involved in the act. They are "figures." They are hardly other than "symbolizations." Hence . . . he is not offering his metonymy as a substantial reduction. For in "poetic realism," states of mind as the motives of action are not reducible to materialistic terms. Thus, though there is a sense in which the poetic behaviorist and the scientific behaviorist are exemplifying the strategy of metonymy . . . , the first is using metonymy as a *terminological* reduction whereas the scientific behaviourist offers his reduction as a "real" reduction. . . . by reason of the materialist metaphysics, with its assumptions about substance and motive, that is implicit in his system.⁹² • Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkeley, 1969, pp. 507.

Every artist must always remain acutely aware of the subjective/objective distinctions in the idioms of expression required in acts of communication. This state of awareness involves the whole of sentient consciousness, and can be shown schematically as in figure 5. Movement in any direction is always through the middle, and the whole is situated within the domain of language and consequently rhetoric. It is the binding context from the individual's point of view.

On this note it may be reiterated that there is today a general lack of agreement on the essential nature of the very concept of concepts, and it has been necessary to *revive* rhetoric⁹³ ● See C. Perelman and L. Olbrechts-Tyteca, trans. by John Wilkinson and Purcell Weaver. *The New Rhetoric*. The University of Notre Dame Press, Notre Dame, 1969, pp. 4-9.

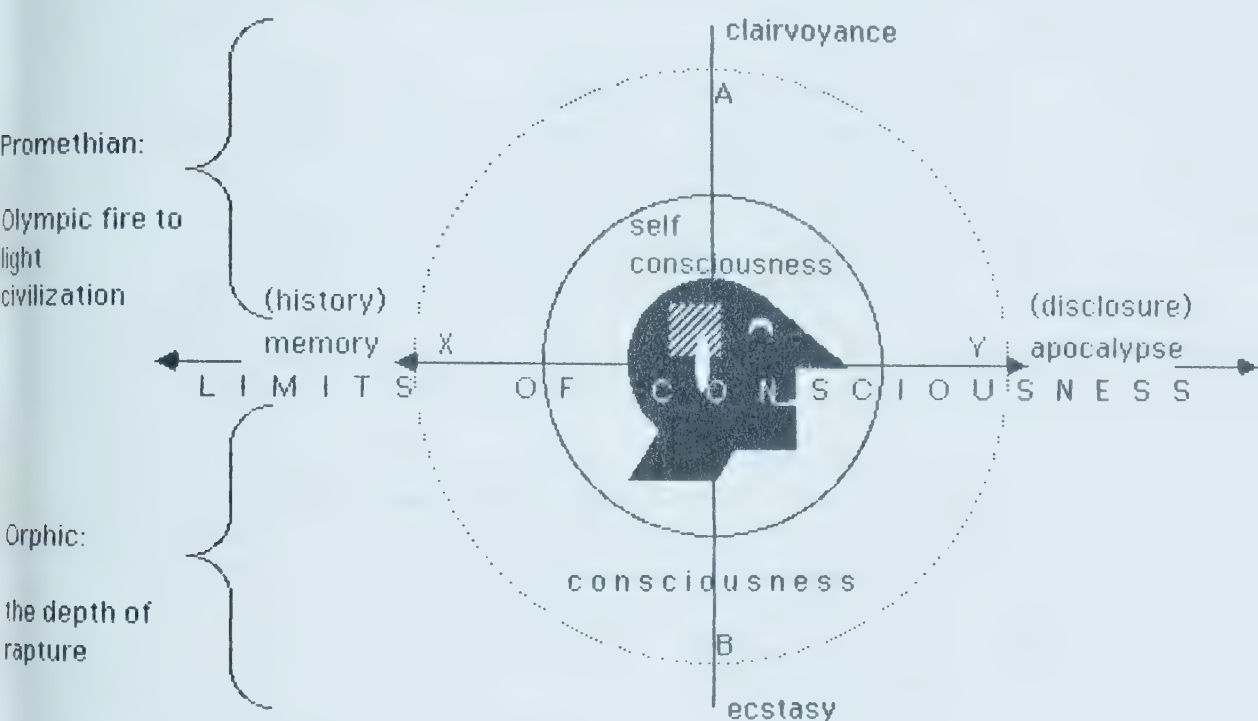
and to reconstitute the principles of language. Burke says, "As a mental state is the 'representation' of certain material conditions, so we could – reversing the process – say that the material conditions are 'representative' of the mental states,"⁹⁴ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkely, 1969, p. 507. which is the fundamental dimension of the phenomenon of concepts, with its, "role in the discovery and description of 'the truth.' . . . It brings out the thisness of a that, or the thatness of a this."⁹⁵ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkely, 1969, p. 503.

Lewis says,

It is one of the mysteries of history that all languages progress from being very particular to being very general. In the first stage they are bursting with meaning, but very cryptic because they are not general enough to show the common element in different things; e.g. you can talk (and therefore think) about all the different kinds of trees, but not about *trees*. . . . In their final stage they are admirably clear but one is so far away from the real things that they really say nothing. . . . Compare "Our Father which art in Heaven" with "The supreme being transcends space and time." The first goes to pieces if you begin to apply the literal meaning to it. . . . The second falls into no such trap. On the other hand the first really *means* something, really represents a concrete experience in the minds of those who use it; the second is mere dexterous playing with counters, and once a man has learnt the rule he can go on that way for two volumes without really using words to refer to any concrete fact at all.⁹⁶ ● C. S. Lewis. *Letters of C. S. Lewis*. Geoffrey Bles Ltd., London, 1966, p. 147.

In all communication something is revealed about one character

BRILLIANT CLEAR-SIGHTEDNESS



DEEP UNCONSCIOUS ECSTASY

Figure 5: The Dimensions of Consciousness

The range consciousness is multi-directional through an inter-connection of factual and emotional knowledge; of memory and imagination.

• Where the anthroposophist would seek to put a decisive diameter to the large circle, one may also see it fading away gradually.

(Adapted from R. K. Meiners. "On Modern Poetry, Poetic Consciousness, and the Madness of Poets," in *Evolution of Consciousness* ed. by Shirley Sugarman, Wesleyan University Press, Middletown, 1976, p. 115.)

by considering it from the perspective of another, which Burke sees as being the four "master tropes" of consciousness: metaphor, metonymy, synecdoche, and irony, which overlap in acts of language. They are the principles of the phenomenon of concepts and form an holistic approach to language. They may be outlined as follows:

1 The phenomenon of concepts exists by metaphoric extension, borrowing words from the tangible world and visceral man, and transposing them into incorporeal concepts. Language therefore operates according to a principle of always establishing particular *perspectives*. "Poetic reality" is therefore, "... deliberate coaching and criticism of the perspective process, characters can be considered tentatively, in terms of other characters, for experimental or heuristic purposes." ⁹⁷ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkely, 1969, p. 504.

2 Language operates according to a synecdochic substituting principle. Linguistic concepts are expressed in terms of something which represents the concepts. Hence, "... the senses abstract certain qualities from some bundle of electro-chemical activities we call, say, a tree, and these qualities (such as size, shape, color, texture, weight, etc.) can be said "truly to represent" the tree." ⁹⁸ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkely, 1969, p. 508.

It therefore is always *representational*

3 There is a metonymic qualitative shift to language. A special kind of synecdoche. Thus, "... every art in its nature as a medium, reduces a state of consciousness to a 'corresponding' sensory body (so material that it can be reproduced, bought and sold). But the aim of such *embodiment* is to produce in the observer a corresponding state of *consciousness* (that is, the artist proceeds from 'mind' to 'body' that his representative reduction may induce the audience to proceed from 'body' to 'mind')." ⁹⁹ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkely, 1969, p. 509.

It therefore always constitutes a delimiting or *reduction* principle. From the reduced physicality the perceiver, via his or her repertoire of knowledge and belief, is able to re-construct a larger range of meaning because of the awareness of the range of consciousness.

4 Language *is* ideation. Ideas in action in individuals is drama. And the substance of drama is irony – that is, there is a dialectic drama of opposites. Therefore, "... you cannot have ideas without persons or persons without ideas. ... Irony arises when one tries, by interaction of terms upon one another, to produce a *development* which uses all the terms. ... They are all voices, or personalities, or positions, integrally affecting one another." ¹⁰⁰ ● Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkely, 1969, p. 512. It therefore operates according to a *dramatistic* principle.

On this basis meaning is derived from the sensorium. In every representation of concepts in acts of language there is what Barfield calls the "vehicle" and the "tenor" of expression. ¹⁰¹ ● These are terms that he borrows from I. A. Richards. See Owen Barfield. "The Meaning of the Word Literal," *Metaphor and Symbol* Butterworths Scientific Publications, London, 1960, p. 49.

The first term is used in referring to the surface meaning of an expression (crimson as a hue), and the latter when referring to any other kinds of meaning – deeper and broader – that might also be presented (crimson for passion). The rationalists maintain that both aspects could always find definitive and literal expression to be categorized). In their view there is no room for the "stable sentiments" in the comprehension of concepts. Genuine signs, they say, do not constitute a meaningful expression at all if every aspect of meaning cannot be stated. Feeling is not allowed in the meaning process. ¹⁰² ● See Susan Langer. *An Introduction to Symbolic Logic* Dover, New York, 1953, p. ff.

For them

The passenger in the vehicle could, if he chose, get out and walk. If it were not so, these thinkers hold, the tenor would not deserve the name "meaning" at all; it would amount to no more than emotional overtone. A meaningful expression, as distinct from an emotive one, imparts information and there is no information (they insist) which is not communicable by discursive and literal statement. It is not ... only those who are insensitive to the working of imagination who take this view. ¹⁰³ ● Owen Barfield. "The Meaning of the Word Literal," *Metaphor and Symbol* Butterworths Scientific Publications, London, 1960, p. 49.

In an holistic view the referential and the emotive, the "poetic" and the "prosaic," the surface and the depth, are seen to be

distinguishable but inseparable. It is a manner of working with expression that would cast meaning at a greater field of reference, having both literal meanings as well as those other levels which are emotive in origin but which become those stable sentiments clearly as meaningful to the interpretation of signs as the surface ones.

This holistic concept clearly implies a valuative quality in expression; that there is richer use of language and a not so rich use of language. A theory in which the "what" and the "how" of language remain conjoined. Language is not, as Lotz has it, the vehicle of thought, it *is* the thought as much as the song is the singer's. Rhetoric provides such a basis.

Another proposition can now be made:

Meaning in general finds its locus in holistic language: it is more or less efficacious; has no over-arching systematic inter-relationship of its parts; has social implications.

3.2.1 Concepts as internal Activity

In light of a two-fold meaning process (Drever's, Brandt's and Kim's thesis), it is possible to examine in greater detail how concepts are related, first, to one another and, second, to new events coming into the perceptual field, resulting in new concepts.

It seems clear that the structuralist and behavioural theories, emphasizing direct relationships between the outer environment (stimulus) and the actions of the individual (definitions of response), have limited applicability. Research in various areas ¹⁰⁴ ● Owen Barfield. *Poetic Diction*. Wesleyan University Press, Middletown, 1973; C. S. Lewis. *Studies in Words*. Cambridge University Press, Cambridge, 1960; Frederic C. Bartlett. *Remembering*. Cambridge University Press, Cambridge, 1932; John Parry. *The Psychology of Human Communication*. American Elsevier, New York, 1968; J. B. Biggs. *Information and Human Learning*. Scott, Foresman, Glenview, 1971; Rudolph Arnhem. *Visual Thinking*. University of California Press, Berkeley, 1969; R. L. Gregory. *Eye and Brain: The Psychology of Seeing*. McGraw-Hill, New York, 1966.

has shown perception to be a complex symbolic operation allowing individuals to cope with both simple and complex phenomena in a variety of ways. Rudolph Arnhem sums up much of this research when he observes that "The mind, reaching far beyond the stimuli

received by the eyes directly and momentarily, operates with the vast range of imagery available through memory and organizes a total lifetime's experience into a system of visual concepts." ¹⁰⁵●
 Rudolph Arnheim. *Visual Thinking*. University of California Press, Berkeley, 1969, p. 294.

Nor are experiences limited to one lifetime, they include the full authority of mythico-historical concepts. Nobody can isolate an external stimulus and ignore one's collective knowledge in responding to it. Arnheim continues, "The thought mechanisms by which the mind manipulates these concepts operate in direct perception, but also in the interaction between direct perception and stored experience, as well as in the imagination of the artist, the scientist, and indeed any person handling problems 'in his head'."

¹⁰⁶● Rudolph Arnheim. *Visual Thinking*. University of California Press, Berkeley, 1969, p. 294.

As a thinking being, every individual attempts, first of all, to bring order to the vast array of experiences with the intention of ascribing to it some meaning. The process is internal and goes on unawares to the thinker. It is the means whereby the thoughts actually held can come into being.

Ulric Neisser has observed that an individual first, subconsciously, apprehends the whole and then the composite parts but ultimately integrates wholes and parts. This is what above has been called secondary meaning. He states that mentally, "Whatever we know about reality has been mediated, not only by the organs of sense but by complex systems which interpret and reinterpret sensory information. . . . The central assertion is that seeing, hearing, and remembering are all acts of *construction*, which make more or less use of stimulus information depending on circumstance." ¹⁰⁷●
 Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, pp. 3-10.

The process of constructing is assumed to be divided into two phases. Upon first receiving a sensory stimulus the entire field is scanned, according to Neisser, in a manner that is "fast, crude, wholistic, and parallel." ¹⁰⁸● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p. 10.

This allows an individual perceiver to be, first of all, generally aware of the large number of elements in both the external environment and the internal memory store. The mental scanning process simultaneously explores several possible interpretations. In doing so

it is a selective process, some are chosen for further processing and others are ignored because they are deemed to be irrelevant at the moment.

Suppose someone is sitting on a bench and reading a book in the park. Nearby are children playing. There is shouting and crying; there are dogs barking toys whirring and buzzing, etc. Yet the noise is not in the reader's consciousness at all even though there are at times obvious cries of a child in some minor distress. However, if the reader is also baby-sitting, the noise of the children may be quite out of consciousness and cries of distress unobserved until the child in his charge cries. Then the signal is not ignored but is interpreted as being important because of other mentally stored data and rises to consciousness. Neisser calls the cognitive process a selective activity.¹⁰⁹ ● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p. 7.

Cherry says,

And the whole of this proceeds amid what we may call "environmental uncertainties"—street noises, other people's chatter, dogs barking. It is remarkable that human communication works at all, for so much seems to be against it; yet it does. The fact that it depends principally upon the vast store of habits which we each one of us possess, the imprints of all our past experiences. With this, we can hear snatches of speech, see vague gestures and grimaces, and from such thin shreds of evidence we are able to make a continual series of inferences, guesses, with extraordinary effectiveness.¹¹⁰ ● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 280.

The second phase of the constructive process is "deliberate, attentive, detailed, and sequential."¹¹¹ ● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p. 10.

It is a synthetic process which builds up complex conceptual entities based on details from both the external and internal sources. But this building process is not a reconstruction of "what is out there." What is stored in memory bears no direct relation to physicality. The process is one of bringing mental order and structuring. A perception is interpreted in terms of rules of structuring that have been used to interpret on previous occasions as well as being modified by the new perception. Neisser questions, "What is the information . . . on which reconstruction is based?" and continues, "The only plausible possibility is that it consists of traces of prior processes of construction. There are no stored copies of finished mental events,

like images or sentences, but only traces of earlier constructive activity." ¹¹²● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p.285.

When the baby-sitter's own child cried the perception was completed because the sound pattern conformed to earlier experience. But there was no stored "cry" in the memory of the individual. A re-construction took place based on remembered data (familiarity of the pitch, the stressful intonation, and the fact that he was at the moment baby-sitting). The other children's crying never entered the second phase of the cognitive process.

It must be remembered, however, that *none of this constructive activity ever appears in consciousness*, only the product does, "to construct something attentively is to see it clearly." ¹¹³● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p.301.

Hence someone legitimately exclaims, "Oh no!" or "Yes, I understand." or "Oh, I remember." Encountering a stimulus triggers the reconstruction process which is *experienced* as mental images. We confidently claim the images to be legitimate linguistic concepts through which the vast and variegated external environment obtains meaning – comprehension.

Sometimes, through the exercise of creative freewill, (either speaking, writing, or drawing) the reconstructions "may achieve representation in other modalities if an appropriate coding system exists." ¹¹⁴● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p.301.

Rhetoric, which attempts to bring various concepts into proximity for another perceiver in a manner that will elicit a response, is the external "coding system" of concept processing.

3.2.2 Concepts as External Activity

It has been demonstrated that concepts and being are spherically united. From amongst all of the many concurring and seemingly fortuitous events, each person's perceptual mechanism attempts to make selective interpretations of these often conflicting occurrences. In a communication situation, where mind attempts to meet mind, the perception of linguistic concepts is possible only through a process of translating them into some physical and perceivable form. To that end the physicality must be

understandable by both the sender and the receiver. There must exist a degree of conformity between them. The original mental experience of the sender is transformed by physical processing; there are no concepts in the external environment, only things and events that can represent them. The physicality of language is a mediating device only, a mere representation of concepts, required by the perception process of the receiver. Hence the language experience may be said to have been externally processed to accommodate the perceptual process. Neisser's "other modalities."

Any *thing* can thus be designated as a conceptual representamen having the potential to be interpreted by someone if there is some level of agreement that the thing can function in this manner. The creation of a representamen occurs at the moment it becomes obvious that something is intended as a language event and is a deliberate selection or construction amidst the vast array of events.

Once apprehended, every conceptual entity exists in a subconscious system of knowledge and belief, which, in turn affects the way in which external sensory information is interpreted. It either works to affirm or reject external eventfulness; it is a "network of implication" in the mythopoeic impulse. Every individual thus assumes and develops a particular bias from which everything else entering cognition is interpreted – perspectives. This is a non-stop process of consciousness. Lewis says, Everything I know is an inference from sensation (except the present moment). All our knowledge of the universe beyond our immediate experiences depends on inferences from these experiences. If our inferences do not give a genuine insight into reality, then we can know nothing."

¹¹⁵● C. S. Lewis. *Undeceptions*. Geoffrey Bles, London, 1971, p. 18.

It is clear from the discussion above that terms of meaning are always complex. The basic premise is that meaning for the individual consists of inter-related components: first, directly perceived environmental eventfulness, second, deliberately selected or created events to represent linguistic concepts about the general environment (from some other person) and third, the individual's stored system of knowledge and belief, which is comprised of memory plus cognitive habits based on a network of implications. None of these can be artificially isolated, they operate as a unity. The entire process of interpretation can be shown schematically as in figure 6.

From this discussion another proposition can be stated:

Meaning is contingent on a person's system of knowledge and belief consisting of elements from ones environment plus elements manifest through signs and through the internal processing of this external information.

i.e.

meaning=

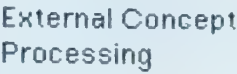
system of knowledge & belief	}	
internal information processing	}	each affects the other and all
environment and signs	}	contribute to meaning

3.2.3 Interaction Between Internal and External Concept Processing

What is being posited here is that the interaction between the external and internal processes is *dynamic* and in a constant state of fluctuation. An individual's system of knowledge and belief is constantly involved in a "credibility check" of all perceptual phenomena. Given such a process, there exists the constant possibility of incompatibility between internal and external components. This occurrence has sometimes been referred to as "cognitive discrepancy."¹¹⁶ ● Richard deCharms. *Personal Causation*. Academic Press, New York, 1968.

or "cognitive dissonance"¹¹⁷ ● Leon Festinger. *A Theory of Cognitive Dissonance*. Row, Peterson, Evanston, 1957.

What has been suggested is that during any given experiential moment the presence of dissonance between the particular experience and the individual's system of knowledge and belief affects the meaning the present experience has. Dissonance is not a fixed quantity, it varies from slight to extreme. A certain amount of dissonance is almost always present. Moderate dissonance among the components of an experience come to be resolved through internal processing, extreme dissonance cannot be processed sufficiently for resolution to occur. Hence the internal processing



Schematic arrangement of concept processing (interpretation) by the individual perceiver, showing the external and internal components. Conceptual representamen are special kinds of experiences in the environment. The organization of the memory store plus cognitive habits (through the network of implication) become a repertoire of knowledge and belief whereby an individual operates in the environment and interacts with other individuals.

capacity of an individual affects the meaning any experience has for that individual. Different individuals interpret the same kind of experience differently. The system of knowledge and belief is an ingredient in both accepting an experience and in rejecting an experience. But, as that capacity is being altered by new experiences the understanding of particular experiences will vary at different times even in the same individual. The structuring rules

118● Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p.285.

are being constantly revised, allowing for the second and subsequent encounters with a similar experience to be less dissonant than the first encounter was. Both things in the memory store from past experiences and new experiences together work into the resolution of dissonance.

To demonstrate that dissonance is categorical but various, take the following example. A dental hygienist might use a wall chart demonstrating good dental hygiene to a class of students. The chart features a favourite cartoon character. For some viewers the familiarity of the cartoon character may impede in the process of comprehending the stimulus of the poster and in others it would be an asset. Some viewers' focus of attention may move to other thoughts based on other previous encounters with the character, but would be resolvable in the end. The presence of such moderate dissonance then would enhance the understanding because it brings into focus other latent concepts and images and lend credibility and diversity to the present experience.

Extreme dissonance would be present if the familiarity was of another kind, causing the viewer to focus his attention on something else altogether; if the stimulus were so familiar that it proved boring, for example. The viewer might be encouraged to seek other diversions; he may squirm in his seat, poke his neighbour, or begin wishing he were somewhere else. Then there would not be any resolution and therefore no understanding of the experience. The cognitive process thus would yield an interpretation of the experience opposite to the intent of the communicative act (he might conclude that brushing teeth is a waste of time).

The various components of the internal and external processes thus become part of the network of implication within which meaning is determined. All the unspoken understandings (in the memory store), of both the world in general and the stimulus within

the communication situation in particular, are included. They are brought into relationship by implication in the current experience. Therefore the implications enter into and become a part of the mental construction of an interpretation of an experience.

If the students were later asked to create a poster or write a story about dental hygiene based on the lecture some would focus on elements from the earlier experiences implied by the present one. Others would focus on the present one. Focus would vary according to processing capabilities of the individuals concerned.

It must be emphasized that everyone encounters such dissonance in their lives. And that it is possible to hold ideas that are incompatible, as long as they remain separated in day to day living. (Through the art of rhetoric publicists of all kinds attempt to raise dissonances to consciousness.) The communicator must be aware of this dissonant situation.

This means that there must be a process of constant re-evaluation built into the process of giving physical form to concepts. There can never be the attitude that he or she has constructed the definitive form. The art of rhetoric works *within* the area of cognitive dissonance. Such awareness, and the application of rhetoric, encourages visual exploration and is the basis for it. It is also the reason for challenging every technological change that occurs in order to maximize the form-giving capabilities of that technology – expression.

From this discussion the following proposition can be made:
 Interpretation in the phenomenon of concepts is affected by the cognitive dissonance between the external and internal concept processing systems.

It is now possible to give a general definition of graphic representation. It is the making, through autographic and mechanical means, of marks and images juxtaposed in space, for establishing meaning in human terms, for the express purpose of influencing the perceiver, and typically in indeterminate relation to the general environment.

4 Informative and Persuasive Concepts

4.1 Signs in External Concept Processing

If concepts have fluidity without one-to-one relationships how is it possible to communicate at all? What are the means for limiting conceptual associations? In order to answer this question one must, first of all, understand that the basic unit of thought is not the word, nor the sentence, nor the paragraph; but that there is always a specific context within which the word, sentence and paragraph obtain significance – that is, the poem, the story, the picture, or the series of poems, stories and pictures is one expression. It may be called the *unit of expression*. And it is a product of Consciousness.

External concept processing is possible only through indicators. C. S. Pierce says that any so-intended physical thing encountered through perception is a representamen “to stand for, that is, to be in such a relation to another that for certain purposes it is treated by some mind as if it were that other.”¹ ● Charles Sanders Pierce. *Collected Papers*. Vol. 1-8, Harvard University Press, Cambridge, 1931-58, Vol. 2, §273.

We call these indicators signs. Augustine says, “A sign is a thing which, over and above the impression it makes on the senses, causes something else to come into thought as a consequence.”

² ● Augustine, trans. by D. W. Robertson Jr. *De Doctrina Christiana*. Library of Liberal Arts, Indianapolis, 1958, p. 34.

These two observations are not identical, but they are complementary. Pierce shows the substitutionary nature of signs, while Augustine indicates that signs are conceptual; signs mediate between conscious minds through sentience.³ ● Kenneth Burke has based his “new rhetoric” on the sign-dependency of consciousness. See Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, pp. 59-60.

Elsewhere Pierce says, “As representation is that character of a thing by virtue of which, for the production of a certain mental effect, it may stand in place of another thing. The thing having this character I term a *representamen*, the mental effect, or thought, its *interpretant*, the thing for which it stands, its *object*”⁴ ● Vol. 1, §564. Charles Sanders Pierce. *Collected Papers*. Harvard University Press, Cambridge, Vol. 1-8, 1931-58.

He “... always connects processes of mediation, sign-processes, and mental processes. This means that he would not accept any

behavioral psychology which attempted to reduce behavior to two-term relations between stimuli and responses.”⁵● Charles Morris. *Sign, Language and Behavior*. Prentice-Hall Inc., New York, 1946, p. 288.

When an individual wishes to make a thought known to someone else, he must create a sign as an integral component of that act.⁶● There must be no confusion between the term “sign” as I am using it and Signification Theory. Where it attempts to make a structural monism of the relationship between signs and the things they refer to, reducing behaviour to a two-term relationship between stimulus and response, my meaning simply applies to the fact that there is no consciousness without mediation through signs. Where it attempts to view language as a science, reducing it to the level of codes which includes behaviour, my meaning gives weight to the perceiver “in himself” who exercises his repertoire of knowledge and belief in which there are non-rational emotive factors brought to bear.

There must also be no confusion between the term “sign” and the term “symbol.” It must be understood that the term symbol, has a much more varied meaning than sign. Consider the following comparison: “The time-worn symbol of the cross stood high upon the coppered spire of the old stone edifice” and, “She bore her cross in charity as a symbol of her Christianity.” There is an enormous difference in the implication of these two usages provided by the contexts. It may be noted that there is a discrepancy between the usage in Susanne Langer’s, *Philosophy in a New Key* and *Feeling and Form*. She clarifies this as follows: “In *Philosophy in a New Key* and in *Feeling and Form* the major distinction was drawn between ‘signs’ and ‘symbols’; Charles W. Morris, in *Signs, Language and Behavior*, distinguishes between ‘signals’ and ‘symbols.’ This seems to me a better use of words, since it leaves ‘sign’ to cover both ‘signal’ and ‘symbol,’ whereas my former usage left me without any generic term.”⁷● Susanne Langer. *Feeling and Form*. Charles Scribner’s Sons, New York, 1953, p. 26.

The term “sign” is the broadest term possible, it is simpler and uncluttered with cultural baggage, and it can include both “signal” and “symbol” and it is therefore the more suitable as a generic term. It must be remembered, however, that there is a radical difference between “signal” and “symbol.” A signal is comprehended when we are made aware of the object or situation it relates to. A symbol is comprehended when we understand the idea it presents. The term sign is best used where it stands for any and all physical events used in communication. The term symbol is best used when applied to those “... Things regarded by general consent as naturally typifying or representing or recalling something by possession of analogous qualities or by association in fact or thought...”⁸● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p 7.

The term “symbol” has cultural meaning as its origin.

Therefore sign will be used where a generic term is needed because

it avoids the confusion that can result from the word "symbol." Because rhetoric is a method of efficacy, and graphic representation is an attempt at efficacious communication, both usages are equally important for its theoretical base.

Signs, because they are mediatory between the concepts they refer to and the individuals who perceive them, have a special relationship to other factors in the communication situation. The sign is not a neutral "container" of concepts. Ogden and Richards say:

Between a thought and a symbol [sign] causal relations hold. When we speak, the symbolism we employ is caused partly by the reference we are making and partly by social and psychological factors—the purpose for which we are making the reference, the proposed effect of our symbols on other persons, and our own attitude. When we hear what is said, the symbols both cause us to perform an act of reference and to assume an attitude... Between Thought and the Referent there is also a relation; more or less direct (as when we think about... a coloured surface we see), or indirect (as when we 'think of' or 'refer to' Napoleon), in which case there may be a very long chain of sign-situations intervening between the act and its referent [historical writings and pictures]... between the symbol and the referent there is no relevant relation other than the indirect one... round the two sides of the triangle.⁹ ● C. K. Ogden and I. A. Richards. *The Meaning of Meaning*. Harcourt, Brace and Company, New York, 1948, pp. 10-12.

To put this another way, concepts consist of inter-related phases, (1) Thought: an interpretation of something from either the present real world or of something from the memory store of some past thing which is intended to be shared, (2) Sign: by virtue of a language, and (3) Reference: there always exists that which is thought about. Both the sign and the reference to a thing *together* instigate a thought and hence become associated in that thought. This means that signs direct and organize thoughts. But one must bear in mind that "Speech cannot organize things; it organizes thoughts in people, and people organize things. The trouble is, of course, that we have no direct access to other people's thoughts; we cannot observe them, but only the physical signals [signs], and the people uttering them."¹⁰ ● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 112.

The visible or audible organization of signs is therefore not separable from action in real life. We are systematizing creatures by virtue of our linguistic nature.

The mental process in the triad is what Pierce calls the

interpretant. "A sign has two objects, its object as it is represented and its object in itself." ¹¹● Charles Sanders Pierce. *Collected Papers*. Vol. 1-8, Harvard University Press, Cambridge, 1931-58, Vol. 8, §333.

The "object in itself" is necessarily that of interpretation; that is, it is the "ground of the representamen." ¹²● Charles Sanders Pierce. *Collected Papers*. Vol. 1-8, Harvard University Press, Cambridge, 1931-58, Vol. 2, §228.

To construct a sign is therefore contingent on the interpretive process. But this process of interpretation is itself contingent on the use of further sign relationships as concepts. Richard Robins, in commentary on Pierce, says, "A sign does not function as a sign unless it is understood as a sign, that is to say, unless it determines an idea to be itself a sign of the same object." ¹³● Richard Robins. *Annotated Catalog of the Papers of Charles S. Pierce*. University of Massachusetts Press, Amherst, 1967, ms. 599.

This means that signs are generative. Every moment of thought is both an end and a beginning, as a continuum. Herein lies the fluidity of language; signs refer to other signs as conceptual associations. Pierce says:

All that we directly experience is our thought—what passes through our minds; and that only, at the moment at which it is passing through. We here see thoughts determining and causing other thoughts, and a chain of reasoning or association is produced. But the beginning and the end of this chain, are not distinctly perceived. ¹⁴● Charles Sanders Pierce. *Collected Papers*. Vol. 1-8, Harvard University Press, Cambridge, 1931-58, Vol. 7, §337.

Hence conceptualization is a system of translation, not a collection of "data." The memory store of each individual is thus always a part of the translation process, merging into new associations. One might define this vast array of conceptual associations as being represented by a sign repertoire ¹⁵● Ehses. "A Semiotic Approach to Communication Design," *The Canadian Journal of Research in Semiotics*, Vol. 4, No. 3, 1977, p. 53.

in consciousness.

The tri-dimensional relationship can be shown schematically as in figure 7.

When an individual wishes to communicate he plugs into a continuous stream of signs which, by definition, are accessible to more than one individual.

Through the various disciplines people have traditionally had at their disposal – writing/typography and drawing/ photography –

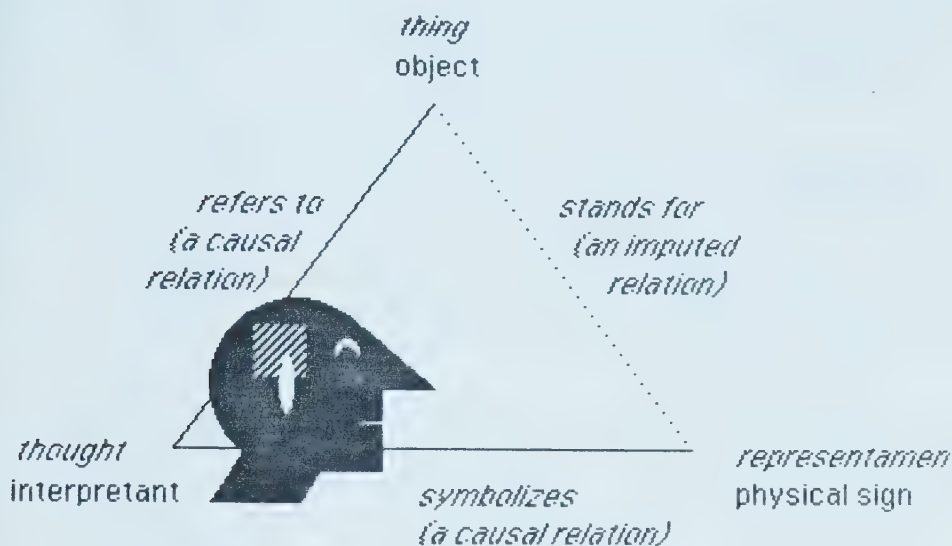


Figure 7: The Sign Triad

The connection between the representamen and the object is always around the triangle through the interpretant, which is to engage the two-stage cognitive process. Hence the mind ascribes meaning and brings the triangle into existence. (Adapted from C. S. Pierce *Collected Works*, Vol. 1, §564. Harvard University Press, Cambridge, Vol. 1-8, 1931-58.)

they have been able to create and arrange signs into larger sign structures. No sign exists in isolation; signs are contiguous. Cherry says, "There is no communication without a system of signs – but there are many kinds of signs." ¹⁶● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p7.

These *systems* have been the means whereby communities have had access to the experiences of others. They are organized but irregular connections between signs. ¹⁷● The primary sign systems that humans have at their disposal are: (1) natural language (a) aural (b) visual (i) visual verbal (ii) visual pictorial, and (2) musical language (with its subclasses) Other more rigidly fixed examples would be logic, mathematics, games, traffic codes, etc.

Sign systems exist as part of natural human sentient and conscious experience. Their collectivity is evident in the subtle shades of meaning as well as in the vastness of mythico-linguistic phenomena. Furthermore, new sign systems are always possible. Small closed sign systems are created within a communication situation in order to achieve specific goals of meaning and communal behaviour; (e.g. traffic signs.) The communicator must be sensitive to both the wider mythic proportion of the sign repertoire and the situation-specific dimension – the entire binding context.

While sign systems tend to become proscribed according to social grouping, with local permutations of physical form, their universal learnability and understandability is striking. ¹⁸● See John M. Kennedy. *A Psychology of Picture Perception*. Jossey-Bass Publishers, San Francisco, 1974, chapter five.

What is important to recognize about all sign systems is the fact that the internal cognitive process is one of inter-connected orderings which in turn typifies the way in which we perceive the external environment. We attempt to organize it in the process of giving it meaning. Order lies in the conative impulse of the mind and is the innate tendency of man. This is the nature of *all* consciousness, and has been referred to as "deep structure" in language by Noam Chomsky. This is so because the enabling programs of language capacity are the same for all. ¹⁹● See Noam Chomsky. "Language and the Mind," *Psychology Today*. No. 9, 1968.

Signs are the means whereby we both manipulate and respond to our experiences. They lie outside ourselves yet we assimilate them, by the process of conceptualization, into ourselves and in so doing, simultaneously, gain understanding of our relation to the environment and to others. As meaning is contextual, so is the

construction of signs. Internal and external concept processing cannot be separated, they are in practice two components of a single process. The singularity of the process can be shown schematically as in figure 8.

Mathematics, as we have seen, is primarily concerned with relational sets. Numbers suitably demonstrate the importance of the unity. Take, for example, the recall of strings of numerals, as might be required of an automobile parts clerk or telephone information operator. Studies of comprehension by D. B. Yntema, F. T. Wozencraft, and L. Klem show that how numbers are presented has a direct bearing on the accuracy of the recall,²⁰ See Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p. 222. both the duration time of viewing and the configuration are significant factors. And they are linked in some fashion. "... during the presentation of a slow list the subject performs some sort of process that makes it easier for him to recall the list a moment later; but there is not enough time for him to perform this process when the list is presented rapidly."²¹ Ulric Neisser. *Cognitive Psychology*. Meredith Publishing Company, New York, 1967, p. 222. What the perceiver does is devise a grouping of the numbers if none is present in the stimulus. Hence any number series such as 2874931 may be internally "grouped" or reconfigured mentally as 28 749 31 or according to some other private division. Studies show that the average adult can retain between five and nine "things" and then recall them. Therefore in dealing with complex information the maximum number of divisions that could usefully be handled would be, on average, seven.²² G. A. Miller. "The Magical Number Seven, plus or minus two: Some limits on our capacity for processing information." *Psychological Review*. No. 63, 1956, pp. 81-97. When the presentation of numbers is done under abnormal conditions (like shortening the time of viewing) this grouping process begins to break down and recall suffers. However, the situation can be aided if there is an external process of configuration applied to the numbers before presentation. The numbers might be shown as 287-4931, as in a telephone listing. Then the recall is again at a higher level of accuracy because the physical scheme conforms to the mental process.

This example is intended to demonstrate a principle involved in all communication situations. There must be a confluence of the external and the internal components of the perceptual process if

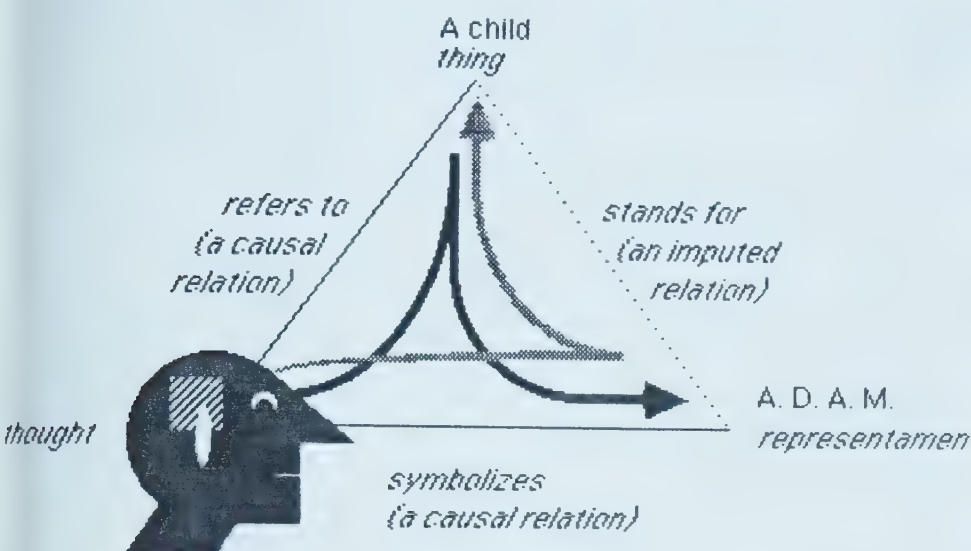


Figure 8: The Mediation of Signs.

When something is apprehended in the environment, and that thing refers to something else, the experience then becomes meaningful. The thing apprehended is thus a sign. It is only possible to be cognisant of something by the intervention of something else that represents that thing – sign. Signs therefore mediate. The sign A.d.a.m. represents the child in his absence. The sign is never to be confused with the thing it refers to, it is purely mediatory. The instant it no longer refers to anything meaning ceases. Signs have no autonomous existence.

comprehension is to take place successfully, and allow meaning to emerge. The external process, intended to reflect and augment the internal process, is what the communicator attempts to accomplish through Neisser's "other modalities" and the exercise of the rhetorical art.

Although in a fundamental way the phenomenon of concepts is a unity, there are basic differences between sign systems that comprise it. A musical expression, for example, of an experience would, no doubt, resemble the experience less than a verbal version, and both less than a pictorial version. Their power to elicit response are different in kind. No single sign system can serve for every communication situation. Much depends on the intent, the intent to influence someone else's thought. And furthermore there is the fact that the varying degrees of the sheer pleasure of sensory perception must be taken into account (aesthetic experience). Therefore the particular characteristics of a sign system must be recognized, and limitations and potentials discovered, in order for the communication to be effective. Not any will serve all situations.

Ordering, inherent in sign systems, is projected out onto society as a whole, for good or ill. Cherry describes it as follows:

Apart from our natural languages... , we have many examples of *systems* of signs and rules, which are mostly of a very inflexible kind. A pack of playing cards represents a set of signs, and the rules of the game ensure communication and patterned behavior among the players. Every motorist in Britain is given a book of rules of the road called the *Highway Code*, and adherence to these signs and rules is supposed to produce concerted patterned behavior on British roads. There are endless examples of such simple sign systems. A society has a structure, definite sets of relationships between individuals, which is not formless and haphazard but organized.²³ • Colin Cherry. *On Human Communication*. The MIT Press, Cambridge, 1957, p.8.

The interweavings of the intentions behind and the failings of order, together, constitute the mythic dimension of society, and calls for different sign systems to be brought into service in human expression. Rhetoric is the means of selection.

4.1.1 Re-Cognition

Every moment of life is a continuous process of conceptualization. Ogden and Richards say that "In all thinking we are interpreting signs. . . . We must begin therefore with Interpretation. . . . Our Interpretation of any sign is our psychological reaction to it, as

determined by our past experience in similar situations, and by our present experience. . . . Sign-situations are always linked in chains. . . ." ²⁴ ● C. K. Ogden and I. A. Richards. *The Meaning of Meaning*. Harcourt, Brace and Company, New York, 1948, pp. 244-245.

In conceptualizing, the first instance of cognition is to know, the second is re-cognition, which is to know again. Every moment of life is a continuous process of knowings. To know means one of several things: to be able to name, to have learned some characteristic attributes, to identify by sight, or to become involved with personally. All these knowings are acts of selection. Recognition is characterized by some overt behaviour in the perceiver dependent on this act of selection. ²⁵ ● See Owen Barfield. *Saving the Appearances*. Faber and Faber, London, 1957, pp. 42ff.

But in order to select there must be things to select from, which involves the entire internal information processing mechanism and consciousness that were shown in figures 4 and 5. Cherry says:

The stimulus sign (a square card) sets up a response sign; the subject may run his finger round the square, or draw it on paper, or name it as a 'square card.' But study of overt responses alone cannot tell the whole story. For the subject who sees the card, and recognizes it as a square, has taken part in a communication event and from that time forth is no longer the same person. His mental state has undergone a change; his subsequent responses have partly been determined by this event. For example, he may recognize a second card more quickly, or he may respond by saying: 'It's like the one before.' But, without using cognitive terms, we can say that the communication event alters the subject's nervous system in some way, setting him into a different state of preparation for receipt of subsequent stimuli. ²⁶ ● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 259.

Thus the act of recognition is not just selection but also classification or even discrimination between classes, as one does in recognizing a flower to be one member of a particular species; or in the recognition of different letter styles. Figure 9 shows a variety of letters all of which are easily recognized, but some of which may not have been seen before. Some characteristic attributes are kept in the memory of the perceiver, as well as attitudes towards those attributes.

What this demonstrates is that despite a great variety of distortions which the mind tolerates, some core invariants remain intact. All the characters retain a certain "letterness" about them. But to encounter letters where they are not expected, say in the



Figure 9: Recognizing Variety in Signs
Various letter signs.

wing of a butterfly, different attributes contribute to the act of recognition. That is, letters are normally seen in books, on posters, etc., and strung together in particular sequences. This fact may be one of the essential attributes contributing to their recognition. In the absence of these attributes other ones are sought. Seeing letters in butterfly's wings is therefore to some degree incredible; they are recognized because of a different set of attributes having only by abstraction to do with word-forms and books.

Recognition involves a great multitude of factors, it is not, as Cherry says, "template fitting," but an activity involving the whole environment. "Recognition is the setting-up of a relationship between two people, or one person and an object, and the particular relevant attributes; the information-bearing elements, depend upon the individual recognizing the sign."²⁷ ● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 262.

The internal information processing system, with the thrust for meaning and the entire system of knowledge and belief, comes to bear directly on the act of recognition. This interaction can be shown schematically as in figure 10. When an individual encounters a sign it is not definite how he will respond. Past experience plays a vital role in formulating the response. We easily recognize and respond favourably to a variety of likenesses of friends ranging from quickly-made contour drawings to colour studio photographs, but turn any one of them upside down and recognition becomes difficult. The past experiences with things influence the response to signs. We have not learned to readily recognize our friends upside down.

²⁸ ● See Betty Edwards. *Drawing on the Right Side of the Brain*. J. P. Tarcher, Inc., Los Angeles, 1979, p. 50.

Gombrich gives another example of the role of past experience in the cognitive process. When one holds a book upright, one perceives a square shape; when one turns it away horizontally, the shape seen is no longer square but lozenge shaped. Yet squareness is still perceived. One still calls the book square. The ancient Egyptian would have depicted it according to this perception. He did not have the laws of perspective within his grasp nor in his history. The lozenge shape did not have meaning. Today one may depict it as either square or lozenge shaped without loss of meaning.²⁹ ● See E. H. Gombrich. *The Story of Art*. Phaidon Press Ltd., London, 1950, index reference "Egyptian Methods."

Since concepts exist exclusively due to their replicas: the

concrete sounds, the scratches on surfaces, etc., the relational position of perceivable signs in the sign triad is one in between the mental concept and the physical universe. The physical signs are therefore fundamentally derivative from the mental concepts they engender and must in some way be constructed based on assumptions held, but the technique of sign-making itself affects the signs made, and further influences assumptions held. There can be no artificial division between the signs and structures used in communicative acts and the actual concrete universe of which we are a part.

Another proposition can now be made:

Signs are means of external concept processing which interact with internal concept processing through the mechanism of perception with varying degrees of similarity/dissimilarity between signs and concepts.

4.1.2 The Pragmatic Nature of Signs

Having established the necessity of signs and sign systems as representamen of concepts, it is now possible to describe their relation to meaning. Ogden and Richards ask, "Is the meaning of unemployment its causes or its effects, its effects taken sociologically, or as the unemployed individual suffers them?" There is, of course, no clear deliniation between the two phases of the question, superficially it is either or both. An adequate answer can only be given if some further articulation is given about the details of specific situations. That is, if further conceptual associations are provided creating a context for comprehension to reside in. Through natural language focus is always on details from which general abstractions are formulated. They continue:

Accordingly various restrictions are commonly introduced by aid of which more specific senses of "meaning," as placed within some system, are obtained. Two of them are sufficiently important to rank as independent definitions of meaning, since each has been made the keystone of a metaphysical edifice, namely "meaning" as the *practical* and as the *theoretical* consequences. In both cases the "meaning" is the rest of the system within which whatever has the "meaning" is taken.³⁰ • C. K. Ogden and

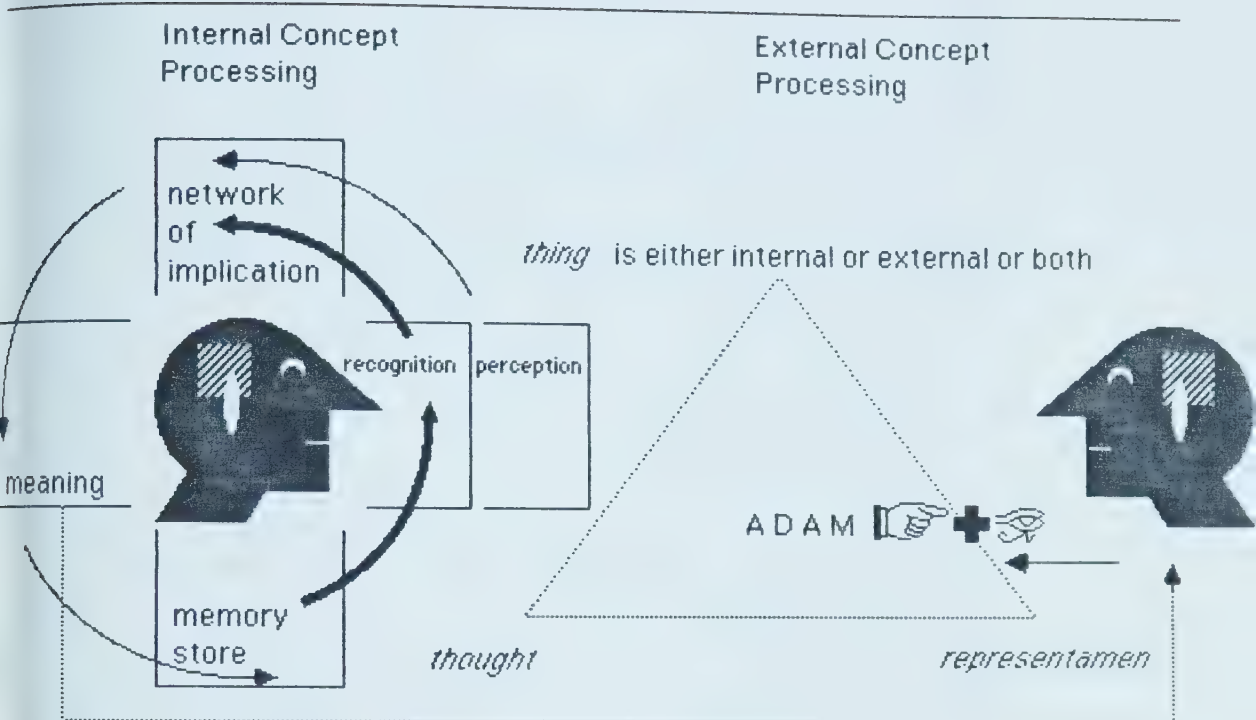


Figure 10: Recognition and the Sign Triad

Schematic arrangement of the act of recognition and the memory store in language. What a representamen refers to is often not a thing at all but some non-existent thing or an abstraction. In such a case it must correspond to memories resulting from past experiences (either direct ones or vicarious ones, like knowing about Shakespeare). The thing is then a part of the internal information processing mechanism and the act of recognition brings it into the semiotic flow. To the extent that a sender of a sign knows the past experiences of the perceiver he can incorporate attributes in the representamen to conjure appropriate responses. But because memory itself is conditional upon the network of implication and meaning, which is always partially unknown to the maker of the representamen it never evokes a definitive response.

(Adapted from C. Cherry in *On Human Communication*, MIT Press, Cambridge, 1957.)

I. A. Richards. *The Meaning of Meaning*. Harcourt, Brace and Company, New York, 1948, p. 197-198.

The communicator is always concerned with specific meanings as they are found *within* a larger community; that is, graphic representation originates in and addresses specific communication situations, but never in isolation from a wider mythico-linguistic base of the society into which it is directed.

The visual language of graphic representation is the expression of details; many small segments of conceptual associations juxtaposed in various image bearers: books, magazines, posters, directional "sign systems", etc., whereby individual perceivers are able to make decisions in regard to particular thoughts and actions. It is contextually meaningful, which is the "rest of the system." It is a relation between signs and their users. But it is an incorrect assumption about concepts to designate pragmatism as being a property of signs, as is attempted in Signification Theory.³¹ See Umberto Eco. *A Theory of Semiotics*. Indiana University Press, Bloomington, 1976, index reference "Pragmatics;" and Umberto Eco. *Semiotics and the Philosophy of Language*. Indiana University Press, Bloomington, 1984, index reference "Pragmatics."

It is no more possible for pragmatism to be a property of signs than for content to be a property of signs. Signs have no existence apart from their pragmatic origin in content.³² Owen Barfield. *Poetic Diction. A Study in Meaning*. Wesleyan University Press, Middletown, 1973, p. 23. Hence communication is an eminently practical affair. William James states that, "the meaning of any proposition can always be brought down to some particular consequence in our future practical experience, whether passive or active,"³³ W. James. *The Meaning of Truth*. Longmans, Green and Co., New York, 1907, p. 210. which suggests that what we think and how we think are inextricably interwoven in the meaning process.

Immediately upon seeing something or hearing any sound a fundamental and instantaneous decision is made in the brain. In the thrust for meaning a question is answered. Was that someone addressing *me*, or was it a mere reflection of light, or the wind, or a dog barking, etc.? This is usually a subconscious occurrence. And it is crucial. On it everything that follows depends, for if you perceive that someone was addressing you, you will immediately search for the *meaning* of the message; if you perceive it to be something other than an address, you will search for its *cause*.³⁴ Colin Cherry. *On*

Human Communication. MIT Press, Cambridge, 1957, p. 312.

A caused sign is not a sign of communication but merely a sign that something happened.

To assume that a physical thing is a constructed sign is to possess evidence of another mind, and you accordingly adopt a position in relation to another human being instead of to a thing. For this reason communication is never a simple stimulus/response situation. Some stimuli break out of the general mass of stimuli and become communication signs (as part of a sign system) which are empirical artifacts (they are deliberately constructed) and are meaningful; the other stimuli are merely signs of occurrences which have causes.³⁵ ● Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 312.

If the perception is that you are being addressed, then immediately the whole linguistic interpretive mechanism is brought into operation, including the entire system of knowledge and belief (through the network of implication); a mental set and a moral attitude are brought to bear on the other individual. Appeal is then likely to be made to the whole personality: the faculty of reason, the faculty of emotion, and the faculty of spirituality. (Aristotle's thesis.)

In the earlier example of the babysitter, the playground noises of toys whirring are signs with causes only. The distressful cries of children who are not in ones charge are signs of communication but are interpreted in light of other stored information, hence go unanswered by you, you assuming that they will be answered by someone else. You might even receive other stimuli of a different kind entirely while sitting on the bench, which lead only to a reflex response. The bench might be rough wood. You might receive a sliver causing you to jump. Such stimuli are no signs at all. (The rough bench can of course lead to conceptual elaboration, but needn't.)

Causal signs are generally easily satisfied in the perceiver. Meaningful signs are not necessarily so easily satisfied. Causal signs make appeal primarily to the faculty of reason (logos). If a door slams you may interpret (deduce) it as being the sign of a draft in the house (caused). You have learned something of environmental conditions. You are just as likely to take no action as to take action because of it. But if you immediately see your child stomping through the room the noise is a sign meaning anger. It then immediately appeals to the other two faculties. Action is also immediately more likely.³⁶ ● See Colin Cherry. *On Human Communication*. MIT Press,

Cambridge, 1957, p. 312.

But the communication signs which we assume are meaningful, do not lead automatically to a *definite* response; they must pass through the cognitive interpretive process before any action is taken.

It is the task of the communicator to so construct visual signs that the perceiver may respond suitably. A smudge on a page is a physical flow of light waves which may be interpreted as a sign. It may be a caused sign or it may be a meant sign; it may be the result of an ink spill or it may be a drawing. The viewer has every right as a cognitive being to demand what it means. What makes a physical stimulus obtain the status of a communication sign is the assumption that there is an underlying *intent* behind the mark as evidence of another human being. This intended meaning implies that it has been constructed or formed deliberately.

As artists have turned more towards private concerns, concentrating on experimentation with the formal characteristics, and on sensory experiential attributes of their materials and processes, they have found themselves distanced from the community. Their images have assumed the posture of caused signs instead of meant signs. The greater the emphasis on formal and experiential characteristics, the more dependent artists have become on other sign systems for support, until the forms have obtained, or been integrated into, as Wittgenstein observed, a learnable vocabulary. For the plastic arts this often means a fixed showplace or gallery which has acquired a meaning and confers on anything within it a subsequent meaning (that it is art). However, the link between the maker of the object and the viewer remains at a distance until the vocabulary is sufficiently known so as to induce participation in the communicative act. Only through the explication of meaning through other arts (critical literature functioning in an interpretive role) does the viewer move into the circle of meaning. Anthony Burgess makes a similar observation regarding music. "... I do not deny that there are cerebral experiences of a nature too complex to be susceptible of expression through any medium except that of music. . . [but] Since the beginning of the romantic revolution, music, having moved away from the dance (and therefore, according to Ezra Pound, risked atrophy), has . . . had to call on other arts, especially literature, to explicate its private messages. . ." ³⁷ ■

Anthony Burgess. *This Man and Music*. Avon Books, New York, 1983, p. 81.

A meaningful sign is therefore always a sign introduced into the

area of accessibility within the binding context. Sign-making is not licentious freedom, but freedom within what I earlier referred to as the "credibility check" being constantly carried out by the network of implication within each individual. A pragmatic view of sign-making is always one that takes into account the height, depth, and breadth of the whole consciousness of man (shown in figure 5). J. Roth says:

Whether we consider consciousness at the highest levels of self-awareness or at the prelinguistic and prereflexive levels of feeling, it helps to structure our world through its selective powers. On the other hand, consciousness is not omnipotent with respect to its power to organize our world. A factor of resistance is encountered in existence. Men exist in a world that already has some structure. However, the structure that is encountered is still flexible, and it allows for the emergence of a plurality of meaning and values. Thus, according to James, our world is one of freedom. Our choices make meaning and value determinate, and we are responsible for significance and quality of our existence.³⁸ ● John K. Roth. *The Moral Philosophy of William James*. Thomas Y. Crowell Company, New York, 1969, pp. 4-5.

Hence sign systems serve many different goals; to convey either true or false information; to edify or to ridicule; to instruct or to deceive; to satisfy or agitate; to work for self or for community. Sign systems come under scrutiny within various contextual bounds. And the signs become, by their presence in the environment, a contributing factor for the quality of life.³⁹ ● See Victor Margolin. "Community and the Graphic Designer", *Isographic*. Volume 12, 1978, pp. 2-4. They give selective conceptual associations (which is accomplished through the rhetorical art) but contribute to the mythic; to the general attitude of a culture, by their prolific and indeterminate relations. Signs are the means whereby people manipulate people, they remain forever mediatory, occupying a position between human beings. Only by their presence is action possible.⁴⁰ ● It must be noted that I am not embracing a fully developed philosophy of Pragmatism, based on a purely scientific and rational naturalism, which presumes that there exists a radical disjuncture between objective reality and perceived reality as we receive it via our sensory and mental apparatus. In this philosophy a sign never gives a picture of reality but is an arbitrary "capsule" which is a mere illusion of reality. This skeptical view of language results in a shadowy world where "knowledge, as well as myth, language, and art, has been reduced to a kind of fiction — to a fiction that recommends itself by its usefulness, but must not be measured by any strict standard of truth, if it is not to melt into nothingness." Ernest Cassirer, trans. by Susanne K. Langer. *Language and Myth*. Dover, New York, 1947, pp. 7-8. What I am positing is that language and life are mythic and

are that about which truth is. It is in this sense that I embrace a definition of pragmatic meaning. Rhetoric is thus a necessary function of sign use. The "plurality of meaning", subject always to wider evaluation, ultimately resides within the mythico-linguistic base of language and culture (through the art of rhetorical communings).

The concept of meaning must therefore be organized and defined in some way within my theory. This may be accomplished by observing the tri-part nature of signs in action and viewing sign systems from various perspectives.⁴¹ These have been adapted from a discussion of the pragmatic nature of sign systems by May Brodbeck in "Meaning and Action," *Philosophy of Science*. Volume 30, 1963, pp. 309-324. Then meaning emerges within the following four inter-related categories:

1 Referential Meaning

This is the relationship that exists between a sign and its concept or between a sign and its object. To know that the visual representamen g.i.r.l. or m.ã.d.c.h.e.n. have as their object a particular biological entity is to know the referential meaning of that visual form. To know that a particular image is a photograph of your wife is to know one referential meaning of that visual form. To know that it is a picture of a woman of a particular age is to know another referential meaning. To know that this woman has hair of a particular colour is yet another referential meaning.

2 Significant Meaning

This is the relationship between (1) concepts or (2) between objects or (3) between representamen or (4) between any combinations of them. To know that girls sometimes pick flowers is to know one significant meaning of girls and flowers. To know that two flowers represented in a picture are the prairie crocus and the wild rose is to know the referential meaning of the image. To know that they are the floral emblems of Manitoba and Alberta is to know the significant meaning of the image.

3 Intentional Meaning

This is the relationship between concepts (or concepts and objects) and the perceiver or interpreter. The concept of a girl has a different intentional meaning to a father than to a suitor. Daylight has a different intentional meaning to a nocturnal feeding animal than to a

daylight feeder. That a particular model used in an illustration resembles someone's wife is one intentional meaning of that image to that particular viewer (as opposed to a viewer whose wife she does't resemble).

4 Behavioural Meaning

This is the response which an individual experiences internally resulting in behaviour when confronted by a representamen, or a concept, or an object. When confronted by a girl both the father and the suitor experience a response internally which may cause them to behave in certain ways. How they in fact behave is conditional on other factors surrounding the perceptual situation, and their system of knowledge and belief.

To demonstrate the inter-relationship of these levels of meaning, take, for example, the sign if the cross. To a believer it has a certain behavioural meaning while to the skeptic, who knows it only as part of general Christianity, it has only significative meaning. To a fanatical opponent of Christianity it may also have a behavioural meaning but which is different from that of either the devout individual and from the skeptic. From this one may say that the internal experience generated by the resolution and non-resolution of cognitive dissonance of sign perception results in the behavioural meaning of that particular image to the particular viewer.

Behavioural meaning is the most complex meaning because it is not limited to a simple responsive action. The entire mythico-linguistic dimension of consciousness is involved in governing the action because signs are never one-dimensional, but tri-dimensional, and being situated within consciousness. It is dependent on intentional meaning.⁴² This is in contrast to Barthes's theory of replacement. Applying the four categories of meaning described above one sees immediately that what he calls "emptying" is by no means empty. To know that a picture is of a man of a particular skin colouration is to know one referential meaning of the picture. To know that his attire is a French military uniform is another referential meaning. To know that this black man is a representative of a French colony is a significative meaning. To know that this black French soldier represents a colonial administration is one intentional meaning, whereas to know that he is a victim of an imperialist government is to know another intentional meaning. To point in disgust at the image is to demonstrate one behavioural meaning. Any particular behaviour is due to a particular resolution or non-resolution of the cognitive discrepancy factor between the external sign and the viewer's internal concept processing

system. To the soldier's comrades-in-arms, upon viewing the picture, a different behaviour is likely; to his mother another. What Barth says is that the depicted black man is no longer a human being but a mere sign; that he has lost his original status. To his comrades he is still very much a soldier and to his mother very much a man. The viewer indeed apprehends a sign, but it is interpreted according to the viewer's system of knowledge and belief which is not limited to the immediate sign situation but takes into account a wider mythico-linguistic reference afforded by consciousness.⁴³ See Roland Barthes, trans. by Annette Lavers. *Mythologies*. Paladin, London, 1973, esp. pp.116-17 and 128-30.

Intentional meaning, too, is complex because it involves the repertoire of knowledge and belief that a sign percipient has. Therefore many cultural, religious, and socially molded notions feed into this level of meaning. It is, in some ways, the most important for graphic representation, because out of it comes the wealth of deep meaning in signs. While the surface meaning of any particular sign may be the same in a particular group of people, the deeper levels may vary considerably from one individual to the next.

When brought to consciousness through the art of rhetoric, these are re-fashioned, altering the significative meaning, as they feed back into the memory store as a new experience, being provoked by encountering the sign. The network of implication has been altered – that is, people may “change their minds” about something through the experience.

In short, then, referential meaning deals with what the representamen, or the object refers to; significative meaning deals with the objective relationships between representamen, objects, or concepts; intentional meaning deals with relationships between concepts for the receiver; and behavioural meaning deals with the actions which may result from having experienced the encounter with representamen, objects, or concepts.

Depending on how representamen and concepts and interpreter are combined, combinations can give rise to different types of meaning. When particular representamen and concepts are combined with particular interpreters they give rise to particular meanings. In most acts of communication there are many combinations of meanings involved simultaneously.

It is clear that the first two categories have to do with internal concept processing and the last two have to do with a combination of internal and external processing, including the resultant action in the community. That is, the first two depend on *individual* human

personality traits and the last two on *communal* characteristics. It is the holistic approach to language, which views sign systems as always being pragmatic because consciousness is conative, remaining aware of and integrating both in the art of rhetoric.

Nothing in the universe “means” without interpretation. A plot of ground may mean grain to the farmer (significative) and may mean housing to the developer (intentional) or may mean, to a child, a place to run in (behavioural), while the phoneme “field” or the visual representation f.i.e.l.d. would be, on the surface, referential meaning. There are any number of combinations of meaning that can be operative for any given thing, but meaning is never inherent in the thing, but contingent. The field (as well as “field” and f.i.e.l.d.) may mean all of these things to one individual.

The communicator must work within the sphere of meaning and draw from the actual concrete world as a source in the construction of signs and sign systems to create the expressiveness of graphic representation. The pragmatic basis of signs always imposes on expression the question of purpose.

The various levels of meaning may be shown schematically as a series of concentric rings, as in figure 11. Behavioural meaning implies the presence of all the other levels and consequently lies at the circumference, referential meaning at the centre.

4.1.3 Signs and Interpretation

Each communicative act can therefore be seen as existing in this series of rings. The objective is to expand comprehension for the recipient so as to fill the ring of behavioural meaning. The communicator must be sensitive to their character in devising signs that appeal to their “middle element;” to their sense of reason, to their emotions, and to their greater sense of well-being. The image must provide reasonable information to the audience about something, it must stir the emotions through the concepts it conveys and the forms used, and in doing so leave the individual viewer satisfied that he or she has participated in something worthwhile; the information must become meaningful at every level (it must teach) the image must stir their emotions (filling, to one degree or another, the whole dimension of consciousness) and give them a sense of well-being because of it. It is within this “convinced group” that referential, significative, intentional, and behavioural meaning must co-exist in a particular way. For this group of people

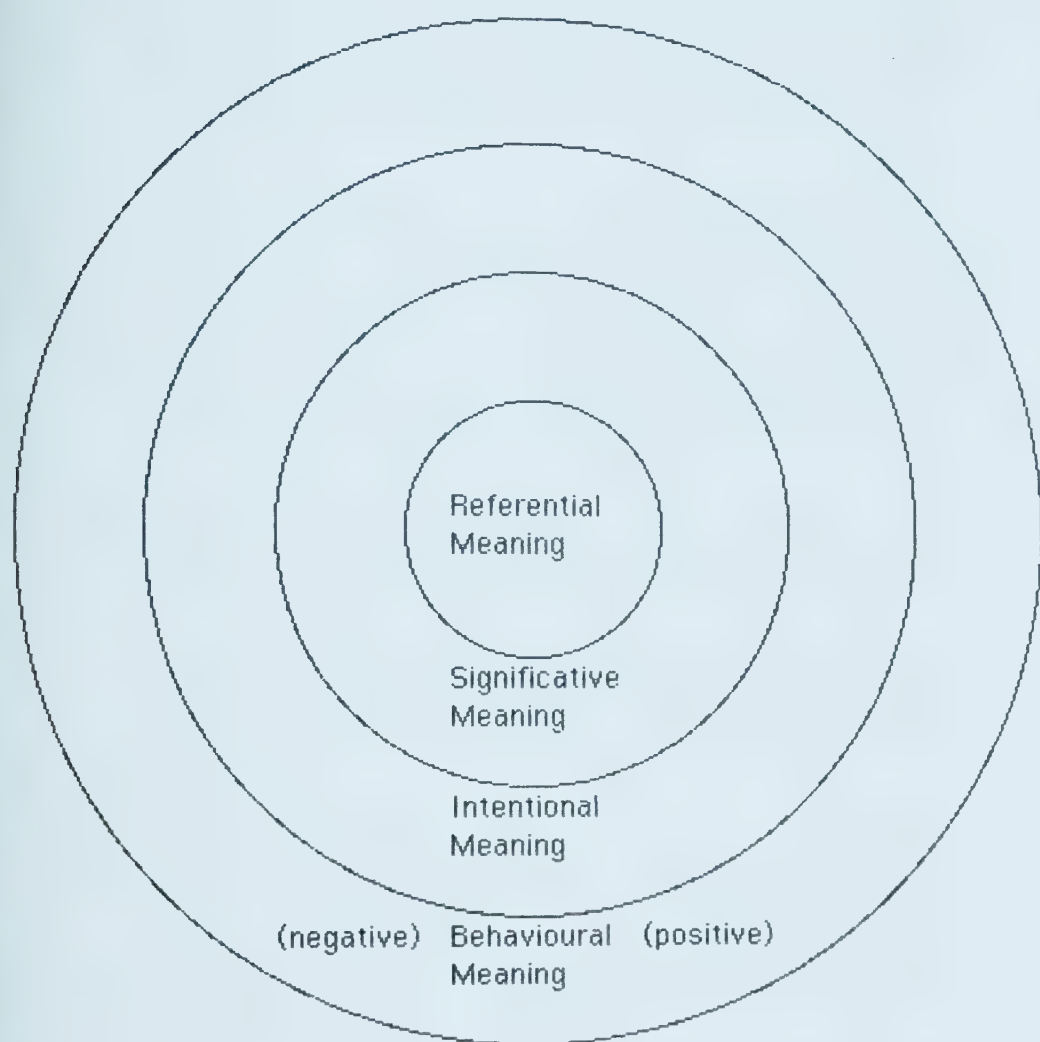


Figure 11: The Concentricity of Meaning

The objective of the rhetorical use of signs is to induce positive behavioural meaning in a core group within a larger indeterminate audience. In doing so there will also be those who demonstrate negative behavioural meaning. Every level of meaning is implicit in behavioural meaning. In some individuals meaning will never exceed the level of intentional meaning, significative meaning, or even only referential meaning.

the cognitive dissonance created in being confronted by the image must easily be resolved (by virtue of concepts held in their systems of knowledge and belief) if communication is to occur. And for them behavioural meaning is to be affected positively; that is, to concur with that of the message sender's intent. They need little "persuasion."

But not all people who see the image will be affected equally. There are those who have only a passing interest in the subject; and who, through the rhetoric of the image, may be affected positively by the appeal because they are predisposed (by virtue of concepts held in their systems of knowledge and belief) to the easy resolution of cognitive dissonance created by having been confronted with the image. Because they are able to be persuaded positively, they move from one level of meaning to another. What began as mere referential meaning ended in positive behavioural meaning.

Also amongst those who will be affected by the appeal will be some who respond negatively because of dissenting concepts in their systems of knowledge and belief. Appeal to their "middle element" may fail utterly because of the manner in which the cognitive dissonance created by being confronted with the image comes to be resolved. It may result in a state of great agitation. Behavioural meaning for them, is opposite to the message sender's intention.

Then there are those who see the image but seemingly do not apprehend it because they have other pressing things on their mind at the moment. For them it is rejected in what Neisser called the first phase of mental "construction." Cognition proper does not occur. Much of everything we encounter in the environment is rejected at this "filtering" stage.

Beyond that are those who, because of concepts in their systems of knowledge and belief, are disinterested in the subject. The image presents a case of greater cognitive dissonance, which is more difficult to resolve. These people fall into two classes. First. There is those who apprehend the image but whose comprehension is governed not by the subject, but by another source. For them meaning attains only the level of significative meaning, even though they scrutenize and deliberate over the image. The image informs them of something, stirs their emotions at a certain level (for example, at an aesthetic level, or an historical interest level, etc.) and gives them a sense of well-being because of it. Behavioural

meaning would be merely self-centred (as those who might put up a poster for only the sensory pleasures provided by the forms) and not as evidence of having "met" the mind of the sender.

Second. There are those who apprehend the image, but it merely "caught their eye." For them meaning remains at a low level. It may or may not exceed the level of referential meaning. The cognitive dissonance created by the image is not resolved because of their pre-conception, governed by their system of knowledge and belief. For them the encounter with the image may be boring or repulsive; their attention turns to something else.

Then there are also those who are temporally distant from the source of the message, for example, those seeing an old pamphlet or poster. For them the meaning of the image does not normally (depending on the longevity of the concept, and especially if it is a poster of an event already past) attain the level of behavioural meaning intended by the message sender. It may, however, attain intentional meaning for those who, by their systems of knowledge and belief, are positively predisposed. It may also generate the same kind of behavioural meaning based on aesthetic grounds mentioned above.

No expression is therefore ever made only for one audience, even if there is a specific group for whom it is primarily intended and has been the basis for its creation. The communicator always has an obligation to a wider and indeterminate audience within the general society in which the source of his or her concepts lies. Therefore the image does not necessarily lose all meaning immediately that the event of the subject is past. Once the image is distributed in a society it feeds into the general cultural setting, and the pragmatic nature of the signs is extended into the general myth.

4.2 Making the Physicality of Signs

In every attempt to give meaning to form, technique is applied to physical substance, and in the process resistance is encountered that lends a particular quality to the resultant image. Different substances lend different resistance affecting the ultimate interpretation of the images. Technique of itself, being a mere causal process, is meaningless. As noted earlier, artists are constantly having to grapple with this meant-sign / caused-sign problem ⁴⁴● See Jacque Ellul, "Art and Technology," *The Structurist* Vol. 21-22, 1981-82.

and the communicator must be aware of this conflict. He must also be aware of whether or not and the degree to which the symbolisms of the visual properties derived from the manipulation process assume cultural meaning through convention or explication. In communication through graphic representation, not only must the signs be interpreted as meant signs, but a particular range of conceptual associations must be maintained. Explication must be implicit in the inter-relationships between signs within the unit of expression.

In every communicative act choices must be made about how technical means are to be employed to achieve meaning. In making an image, the delimiting factors imposed by the physicality of signs poses a particular challenge to the message content. In natural language the physicality of our own bodies are the wherewithal necessary for the appearance of signs, but by extension through technology, other materials become included in the process of sign making. These may be simple or complex. This relationship between materials (agency), methods (act), and form (scene), to achieve meaning (purpose) may be referred to as the *coding properties* of signs.

- 1 Concept: The cognitive intent/result of signs (purpose) depends on
- 2 Mode: That which is the physical sign bearer (agency).
- 3 Technique: The process of encoding signs (act).
- 4 Depiction: The form, manner, or style of signs (scene).

This can be shown schematically as in figure 12.

Regardless of whether the process of constructing signs is a hand technique or a machine technique; whether beginning with the

vague scratches of a scribe on a surface, or with light and photo-sensitive material, or with bursts of energy in a CRT, the resultant marks must be *developed* formally into comprehensible images, assuming any or all of the four categories of meaning (referential, significative, intentional, and behavioural). Therefore a question arises: what implications to the forms of signs and to their interpretation does the manipulation of physical substance have for a communicator?

In an industrial and technological culture everyone is dependent on the complex manipulation of form in communication and McLuhan says that, "For just as a metaphor transforms and transmits experience, so do the media." ⁴⁵ ● Marshall McLuhan. *Understanding Media* (1964) New American Library, Toronto, 1969, p. 66. The media themselves are a component of meaning. Therefore the coding properties are the source for manipulative experimentation whereby signs become meaningful expressions with the potential to influence the perceiver. But convention is another factor.

Compare the telegram and the ordinary letter. One is more technologically oriented than the other. The telegram as a means for encoding and delivering messages, is presumed to be able to fairly transmit any message. Most people would make such an assumption. One realizes that all the alphabetic characters of a telegram are in block capitals and that punctuation is spelled out. To the average reader these are seen as acceptable limitations imposed by the telegraphic process. They impose a greater or lesser amount of reading difficulty. Messages are normally charged for by the word. This constraining factor creates a peculiar set of lexical choices and syntactic structures for the message writer. This also imposes a greater or lesser amount of reading difficulty. Paper is usually of a certain weight, texture, and dimension. Finally, as a practical communication device, most people rarely receive a telegram. During the war, to most people a telegram indicated the loss or injury of a loved one – hence the folk tradition "a telegram means bad news." Therefore from these factors in the social conditions attitudes are established towards it and govern its use.

The letter, on the other hand, has maintained a much wider acceptance in society as a communicative device. Whether hand written, type written, or more recently, word processed, the letter can be fashioned with much greater flexibility, having much more elaborate lexical content and syntactic organization. The message

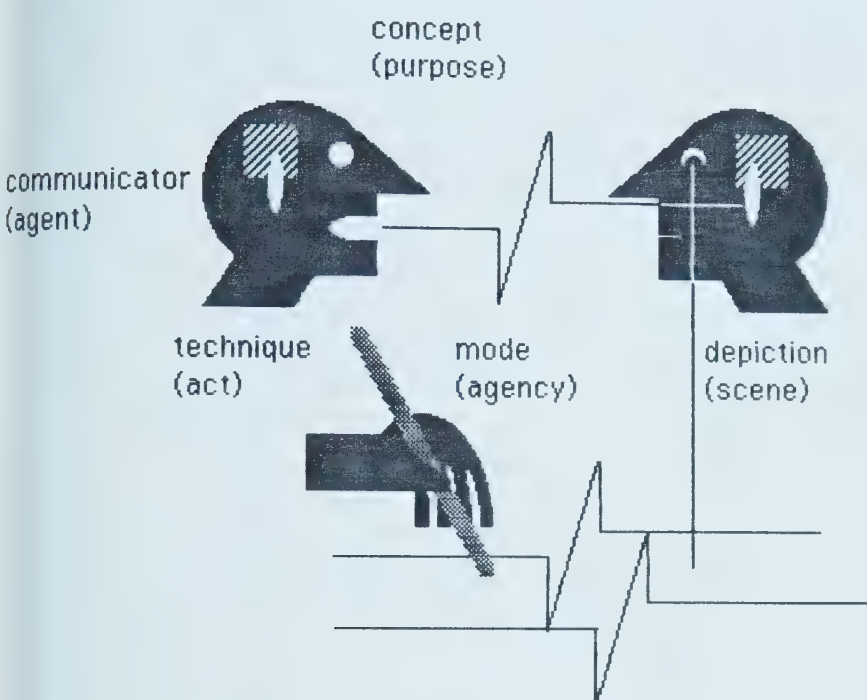


Figure 12: Coding Properties of Signs

A sign system always stands in relation to a technique which is the structuring of some physical substance by a process of manipulation. Resistance is encountered lending particular characteristics to the forms made, whereby various levels of meaning in the perceiver emerge.

may be flamboyant or terse, subjects can be introduced gradually or abruptly at the author's will; pictorial and diagrammatic elements can be added. Letters can be in a variety of styles, depending on either the writer's calligraphic skills and/or the device used to write them. Letters can range from intimate love letters to public notices. Their paper may be smooth or textured, be in a variety of colours, and occasionally come in different dimensions. Their flexibility is reflected in their wide acceptance in many cultures and in the fact that mail has been delivered as a regular daily service in many societies for a long time, while the telegram remains an intransigent mode of communication with limited applicability and acceptance.

What this example illustrates, is that although a sign system is capable of containing a wide range of message concepts, the means employed in manipulating physical substance and making the sign system visible, that is, in giving it form, bears a great influence on meaning; on the comprehension of and attitudes towards the concepts represented in the signs. In addition to the specific conceptual content, what most people relate to is not the signs alone but also to all the institutions and traditions surrounding the particular set of operations in question (telegraphy, letter writing and delivery) together.

There is a particular attitude towards the form-giving process found in every culture and at all times, being in direct relation to the range of choices made available through any given technology. These become pre-conceptions as to what one might expect from technology at any particular time. There are expectations concerning telegrams and letters, as well as posters, booklets, books, magazines, etc. But all of these may be altered through the process of manipulating form in making meaning emerge. Meaning is always related to specific human context; it exists within the communication situation and the binding context. Telegrams, of course, don't always contain bad news and the constraining tendencies of the medium can be overridden and the lexical range of telegraphese can be extended. Innovation depends on the communicator.

Whenever one is engaged in the art of making signs there is necessarily a searching for form, or a quality of depiction. There is experimentation with the second two points of the coding properties to achieve the fourth, and yield a certain range of interpretation. This is so for the simplest acts of communication as well as for the most

elaborate because there is at the root of all expression a neutral something, a physical substance, which must be charged with meaning at the same time that certain characteristics of form are achieved.

Thus depiction emerges through technique, to affect different conceptualizations and attitudes in the viewers, who have various pre-conceptions about the methods used.

One can therefore formulate another proposition:

In a visual sign, meaning emerges from two sources: first, interpretation (through cultural knowledge), and second, coding properties (through the process of form-giving).

4.2.1 Coding Variables

Each time a technical innovation occurs the interpretation of the signs being made, and the cultural pre-conceptions surrounding them, are altered. Whenever a new element is introduced into the relationship of the coding properties, the entire relationship changes. The change may be a substance, a tool, or a machine which affects the mode and technique; (for example, the changes which have occurred historically in writing: pen - to - typewriter - to - type-composing machine, camera, and press - to - computer and different output devices, in relation to changes in natural and synthetic surfaces that bear the image); it may be a particular use that the tools and machines are able to be put to which affects the technique (for example, different computer software); it may be a way in which the the tools and materials interact which affects the technique and depiction (for example the effect of digitization and bit-mapping in relation to the output devices); or it may be the change of attitude towards all of the above (through exposure).

Furthermore, because a process of discovery is being undertaken by manipulating the coding properties, purely invented forms derived from the machines and materials are being introduced. (For example, paper "tooth", graphite grain, points on scribes, film emulsion grain, half-tone screens, bit-mapping dots and their characteristic "jaggies", etc. are points of experiment.) These are the *coding variables*. In the process of experimenting the coding variables are resolved and formal transformations occur: elements are either

added to or subtracted from the intended representation and some degree of arbitrariness is introduced into the form of signs. As they become familiar through use, they become conventions working their way into the pre-conceptions. Thus the coding properties are responsible in no small part for the ever-changing relationship between meaning and form in visual signs.

Another proposition may be stated:

Coding variables always allow an element of arbitrariness into the depiction of signs.

The coding variables must be resolved in every act of communication with the objective of making them bear positively on the meaning that the signs will attain for the viewer. From this principle three fundamental questions arise concerning the making of signs in regard to their form and meaning. They may be summarized as follows:

- 1 *What* does one select to represent a thing or an idea (act)?
- 2 *How* does one depict the representation (created scene)?
- 3 *With what* does one achieve the representation (agency)?

The three questions necessarily always stand together. Their relationship can be shown schematically as in figure 13. The desired application of the coding properties and the resolution of the variables is ultimately a matter of answering these three questions in relation to relative factors found in the binding context.

Another proposition follows:

Meaning in signs emerges through the resolution of coding variables, manifest in the the utilization of mechanical and technological processes.

One further point must be made concerning coding properties. In certain acts of communication, like writing a grocery list or drawing a plan for next spring's garden planting, the process of selecting a

tool and writing surface and using them for the making of the word-signs and/or picture-signs is more or less automatic. It is in accordance with the general level of technology in a given culture. Either simple or complex technology may be employed. Meaning would not be much affected if either pencil or computer were used. Similarly, if someone uses a camera to take a picture of his or her mother, or uses it as a surveillance device, the form of the image does not affect meaning much, even if the focus, lighting, and composition are of a poor quality. Only if the images were so distorted that the grocery list or the garden plan could not be deciphered, or mother were mistaken for aunt Sophie, and the monitor image obscured so that it lost its resemblance to the real situation, would the intended meaning cease to exist. In these instances the meaning is on the surface, so to speak, because the images are interpreted as indexical signs. This inconsequential contribution of mode, technique, and depiction to meaning is due to the fact that it derives largely from a relationship between the interpreter and the object of the sign (intentional meaning) within the binding context.

But in more complex communication situations, with a larger number of factors from the binding context coming into play, and a denser layering of meaning, like writing a report or a story, or announcing an event, then the mode, technique, and depiction are highly consequential to those various levels of meaning. The pre-conceptions and the accepted standards are more complex. For example, (while they are happily becoming increasingly less distinct) three levels of standards may be identified in technological society because of pre-existent expectations. There are either (a) office standards (b) boardroom presentation standards or (c) publication standards, each of which has traditionally expected different forms in the signs. And each of the standards has traditionally been achieved by a different method: this has been found in the pen / word-processor / camera / copier mix available to anyone, and the more complex typesetting / camera / printing press mix available to the specialist, each affording quite different formal elements in both word-signs and picture-signs. Each of these methods necessarily involve different materials: paper, ink, film, emulsion, etc., also bearing on the form. Therefore the forms of the signs (in more complex communication situations) are more carefully considered in light of the coding variables.

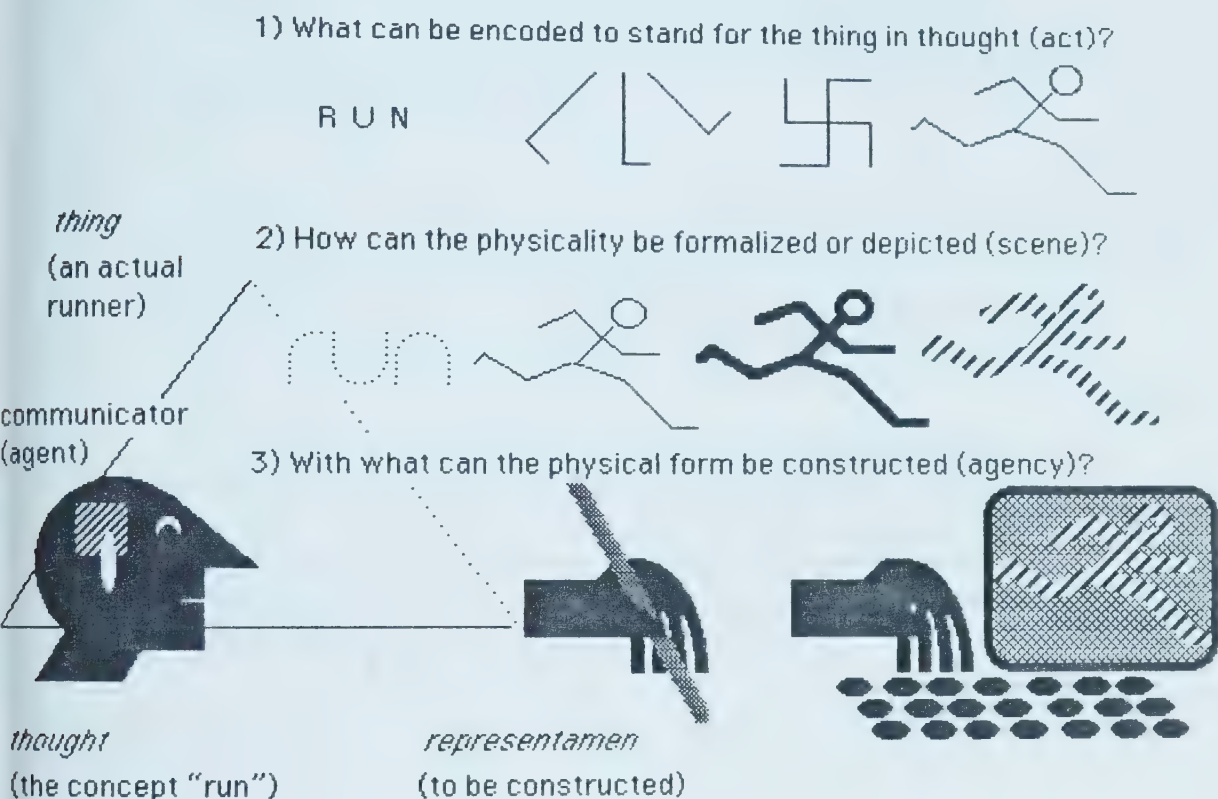


Figure 13: Imputation and Coding Properties

Between a sign and the thing it refers to an imputed relation holds. This means that certain characteristics must be ascribed or attributed to the sign. This raises three contingent questions about the nature of the physicality of the sign.

Thus in addition to the two sources of meaning, the complexity of the levels of meaning within the binding context also affects form. On the one hand, meaning stems solely from the process of manipulating the variables in the coding properties, and on the other hand it is unaffected by them.

This may be stated in the following proposition:

At one end of the meaning spectrum meaning is unaffected by variables in the coding properties, and at the other end, meaning is derived solely from the variables in coding properties.

Graphic representation, because of its wide cultural compass, and because it is dependent on a technical form-giving process for its very existence, must be able to embrace both the sources of meaning, as well as understand the effects of the factors in the binding context on the coding variables, and steer a middle course for its efficacious use of form in resolving them.

4.3 Sources of Meaning in Physicality

In examining the questions concerning coding variables, it is evident that the meaning of signs and their forms are closely related. And that meaning in signs does not always emerge from the same sources, nor does the same sign always derive its meaning in the same way; there are mitigating circumstances. These may be discovered by examining some aspects of the various sign systems available.

To generalize, in some sign systems the object of the sign (the thing referred to), the coding properties (the mode, technique, and the depiction of the sign making its physicality) are not readily distinguishable, for example, in aural language and, to a lesser degree, in music. But in graphic representation the object and its representation are independent albeit inter-dependent entities by virtue of its nature as a technique-dependent method of expression. This separation of the sign from its making is significant in discovering and understanding the different sources of meaning in graphic representation.

Remember, the holism of language is to be found in the context, resulting in the unit of expression, which my purposes has both word-signs and picture-signs. While these both are *signs*, they have quite different sources of meaning. One may say that in graphic representation there are different sign *systems* that comprise the "image." The differences of these co-operative systems must be examined in detail in order to discover sources of meaning.

The origin of graphic representation in natural language, and its dependency on it, must at all times be recognized. Internal concept processing, when thinking privately, consists of a combination of word-concepts and picture-concepts, and may engage them simultaneously or separately in freely interwoven associations because the second phase of the meaning process (what Neisser referred to as "seeing clearly") does not depend on physical substance; the mental "re-construction" of signs is immaterial. But "seeing clearly" is dominated by word-concepts because the function of mind most exercised is physiologically word oriented because it is sequential, categorizational, and logical by nature, as are word-concepts.⁴⁶ See T. Buzan. *Use Both Sides of Your Brain*. E. P. Dutton, New York, 1976.

Yet we are able to say that we "see clearly" because we do actually experience mental images in the process of internal

conceptualization by virtue of the two-sided nature of brain physiology. The other function of the mind is neither sequential nor categorizational nor logical, but holistic and relational.⁴⁷ ● See J. E. Bogen. "Some Educational Aspects of Hemispheric Specialization," *U.C.L.A. Educator*. Vol. 17, 1975, pp. 24-32.

Internal concept processing depends on both functions in the thinking of thoughts; "imaging" provides a supplemental and enriching dimension to concepts by lending, through analogies, spacio-temporal attributes to thoughts.⁴⁸ ● See A. Paivo. *Imagery and Verbal Process*. Holt, Rinehart and Winston, New York, 1971.

In external concept processing, when making signs within the binding context, the dominance of word orientation is obvious in our culture. But even in cultures where alphabets are less fully developed into a system of phonemic indicators, and pictographs dominate graphic communication (i.e. hieroglyphics), picture-concepts serve within the context of word-concepts and are in a direct relation to them. See figure 14. Thus word-concepts, together with their visible representamen (word-signs), are the foundation of graphic communication, but they are not the entire edifice. In graphic representation there is an outward physical approximation of the juxtapositioning of word-concepts and picture-concepts that happens internally as mental concept processing. In the form-giving process there is an attempt to so structure differences between word-signs and picture-signs that comprehension is a natural part of apprehending the image.

4.3.1 Sign Classes

Having established "sign" as the major generic term, this can now be divided into sub-classes of semiotic concepts in identifying some of the differences. Including all visible expression in the definition of signs, I can adopt Pierce's terms of index, icon, and symbol as a means of classifying their functions.⁴⁹ ● See J. Buchler, ed. *The Philosophy of Pierce*. Routledge & Kegan Paul, London, 1940.

They may be defined as follows:

Index: This is a sign situation where the concept arises primarily from the object itself; where there is a direct and causal relation to the object; a one-to-one relation (as in directional pointers).

Icon: This is a sign situation in which the concept arises from an

imitation of the object; where there are one or more attributes which physically resemble the object (as in portraiture).

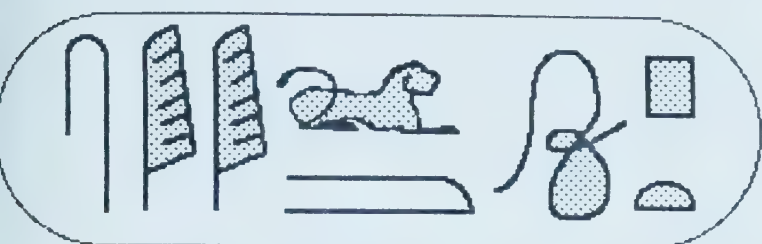
Symbol: This is a sign situation in which the concept does not arise from the object, but represents it in an agreed upon manner. It is an historical and mythico-linguistic definition. It is often at a more abstract level than the object. Through use it is conventionalized. It stands in a one-to-many relationship to its concept (as in words, alphabetic characters, and some identifiers or trademarks).

The different natures of these categories can be demonstrated by a single event having different interpretations. Suppose I take a picture of a man carrying a large rock on his back. Depending on the context of the picture (for example, in a group of his friends) the picture is of X carrying a rock. Thus it is an index. In general, indexes are identified with the reality that surrounds us.

The picture may be so composed as to resemble the classic pose of Atlas carrying the world on his shoulders, in which case it becomes an icon. It could be used to illustrate the tale. Actually, one may speak of a degree of iconicity. The picture only bears *some* resemblance to the classic concept. Its ability to represent something is always governed by the number and kind of properties of resemblance that it has. These recognizable features are, however, always subject to social criticism and revision.⁵⁰ ● See Umberto Eco. "Introduction to a Semiotic of Iconic Signs," *Versus* No. 2, 1972, pp. 1-15.

In communication through graphic representation the problem of iconicity is of major importance. Much of its imagery is iconic (illustrative drawings or photographs of people, animals, plants, and other objects; diagrams, charts, and maps) and the degree of clarity in graphic representation – that is, comprehension – is a question of iconicity; whether or not a given image represents something from the real world successfully.

Put into yet a different context, the picture of my example may speak of the concept of strength and endurance because of the physique and posture of the subject. It then becomes a symbol. Symbols depend entirely on the cultural context.⁵¹ ● See Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 7. Their function and meaning is a matter of social agreement. In different cultures and at different times the symbolism of physique



(C H I I D F E 2)

ΠΤΟΛΕΜΑΙΟΣ

P T O L E M Y

Figure 14: Picture-Concepts Within the Context of Word-Concepts
Picture-concepts exist within the context of word-concepts as syllabic logographs in the hieraglyphic representation of natural language, from which a general principle may be drawn for the relation between pictures and words in graphic representation. Shown is a progression from pictographic to phonemic representation.
(Adapted from the Rosetta Stone, housed in the British Museum.)

would vary.

Signs may also be divided into classes in a different way, by thinking of the degree of iconicity as follows:

Pictographs. Signs may retain a high level of iconicity, as in the photograph of my example, or they may retain only a low level of iconicity, as in a simple sketch. Signs with varying degrees of iconicity are termed pictographs.

Ideographs. Signs with no iconicity fall into two classes:

- a) There are those which might be termed ideographs proper. They are signs like Oriental characters, mathematical notations, numbers, punctuation marks, etc. They carry self-contained ideas or concepts.
- b) There are also non-iconic signs which by themselves have only referential meaning, but when contiguous with other signs are able to form larger concepts or ideas. Such signs make up the alphabetic characters of Western culture; by themselves they are merely referential non-iconic phonemic indicators but together with other letters and/or pictures attain higher levels of meaning as more complex concepts are formed.

It is, however, important to note that symbolism and iconicity are not mutually exclusive. Their co-operation is the basis of many identifiers and trademarks, as well as of the isotypes of Otto Neurath.⁵² In the isotypes (International Typographic Picture Education) a variety of broad cultural concepts are "pictured" in typical poses and organized into a series of pictographs in an attempt to systematize language. See Otto Neurath. *International Picture Language: The First Rules Of Isotype*. Kegan, Paul, London, 1936. See also Michael Twyman. "The significance of Isotype," *Graphic Communication Through Isotype*. University of Reading, Reading, 1975, pp. 7-17.

From this co-operative perspective the relationship between the word-concepts and picture-concepts of graphic representation can be examined to discover sources of meaning.

There is, in all graphic communication signs, a *degree* of "wordness" and a *degree* of "pictureness." This must be seen on two levels. First. A word-concept is obviously perceivable to the eye only by its concrete "pictureness." See figure 15. This image is variable, and can take on many different characteristics.

Second. Word-concepts (consisting of non-iconic contiguous

indicators forming word-signs), and picture-signs (consisting of varying degrees of iconicity), when they have the same thing as their object, will have quite different visible signs as their representamen. See figure 16. All the signs in graphic representation show these elementary characteristics.

In establishing the sources of meaning it is, first, important to bear in mind that signs exist *as* systems. Second, one may look at the expression of concepts as *separate* systems.

Natural language, as a separate sign system, is not at all constrained by the things referred to. Like music, however, it is constrained by *conventions* established in the system of signs. For example, what musical stimuli or sounds point to are not extra-musical concepts but other musical events about to occur.⁵³ ● Leonard B. Meyer. *Emotion and Meaning in Music*. University of Chicago Press, Chicago, 1961, p. 35.

Only the convention of the musical scale establishes precise notes. These cannot be arbitrarily changed without defining a new convention.

Natural language is perhaps even more highly conventionalized than music. Barthes drew two conclusions. First. The phonemes "dog" and "hund," regardless of their origins, may for all practical purposes be considered as arbitrary sounds which only over time have become fixed as representations of the same object. But once they are fixed and the respective languages are learned the user is not at liberty to change them at will. This fact about the use of signs he called *unmotivated*. However, there are signs whose object is a close approximation of the thing referred to, as in onomatopoeic words and phrases: "the tug chugged up the cove." Of them he said "... we shall say that a sign is *motivated* when the relation between its signified [the object] and its signifier [the representamen] is analogical."⁵⁴ ● Roland Barthes, trans. by Annette Lavers and Colin Smith. *Elements of Semiology*. Jonathan Cape, London, 1967, p. 51.

This is the broad cultural source of meaning in all signs; there are two ways of representing anything: by inventing something previously not used or by analogy to something given. In the sign system of natural language this has one bearing on meaning, in other sign systems it has another.

In natural language, once any phoneme is accepted, it becomes recognized by convention. So regardless of the source of the phoneme, whether invented or analogous, it is *convention in the sign*



Figure 15: Concrete "Picture-ness"

The word-concept is perceivable only by its concrete "picture-ness."

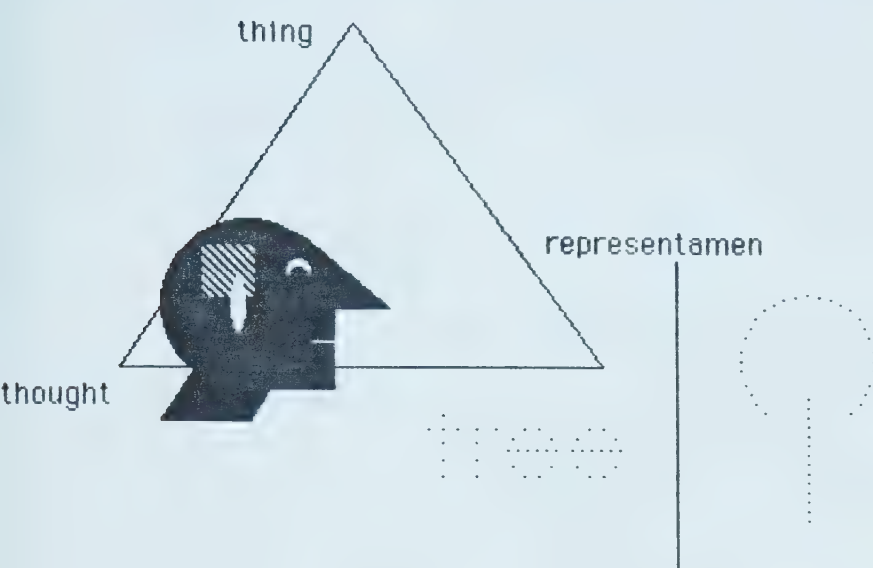


Figure 16: Fundamental Characteristics of Word-Signs and Picture-Signs
Concepts expressed graphically are either non-iconic contiguous phonemic indicators (word-signs), or icons (picture-signs).

system that places a constraint on meaning.

Another conclusion Barthes derived from natural language is that the etymology of certain words shows evidence of distinct repetitive conventionalization – standard usage derived from imitating certain root-words, which is undergoing constant change, slowly as in natural language or rapidly as in slang. He continues, "... a system is *arbitrary* when its signs are founded not by convention [i.e. temporally fixed], but by unilateral decision. ..." ⁵⁵ ● Roland Barthes, trans. by Annette Lavers and Colin Smith. *Elements of Semiology*: Jonathan Cape, London, 1967, p. 51.

Thus under various circumstances established convention may be contravened. In a family group, for example, "dog" may become "bow" because a child, with its limited speech, has established it as such. This idiosyncratic sound, then, has meaning within that particular setting. Unilateral naming has taken place. It has taken on meaning only within the immediate context. It has been learned and accepted. It has a limited convention.

Natural language is full of such unilaterally established conventions within specific settings (telegraphese, peer group slang, dialects, etc.) which all have cultural origins, and have a bearing on the interpretation of signs generally because they become conventionalized and work into the greater mythico-linguistic dimension of society.

Similarly a particular object can come to be represented by an entirely different representation. A facial tissue for example, can be identified not by its generic term but by a substituted representation: "kleenex." Given time and repeated use, the substitution is learned by a large segment of society. It becomes conventionalized and a transposition has occurred. However, the repertoire of knowledge and belief plays a role in its acceptance. There must be a degree of conceptual validity within the context. The motivational force of "dirtex" might not be nearly as successful.

Natural language is at once highly constrained by conventions in the sign system, but admits into the system unconventional sources of meaning (which are constrained by analogy to the object referred to) and which in turn become conventionalized. Convention in the sign system is the main source of meaning.

When made visible by typography another dimension is introduced into language. Depicted form can take on a variety of characteristics as is evidenced by the use of a wide range of

differently depicted alphabetic characters (as shown in figure 9) to which new variations are constantly being added. Where conventionalization in the system of phonemes is the major source of meaning in natural language, when made visible, only that aspect of letters functioning as phonemic indicators remains so constrained. When conjoined and functioning as word-signs, when depicted, letters are not constrained so much by conventions. In graphic representation Kleenex may also be K L E E N E X or **kleenex** or *kleenex*, etc. adding another dimension to meaning. This dimension of meaning, while having the same source, is arbitrary and often unilateral invention to a larger degree.

If the depiction of form is taken as an independent sign system, it imposes no particular constraints on the form that the object must take in the representamen. Objects may be represented with thick lines or thin lines or no lines at all. Letters may be even or uneven. Cats and mice may be pink or green. There is limitless choice. In free drawing from nature, cats and mice in a landscape may be drawn to resemble different animals or no animals at all in the representation. The position of a house may be shifted or it may be eliminated entirely. Depicted form can take on a wide and indeterminate range of meanings. Depiction in drawing is arbitrarily established with no necessarily conventionalized relationship between the concept and its depiction. Depiction as an independent sign system has *no* inherent constraining characteristics on form; that is, meaning is not constrained by the system but by other factors (e.g. whimsey, aesthetics, etc.) because meaning is in an indeterminate relation to form.

But in depicting word-concepts an element of constraint enters in. In typography there is always a question: at what point does the depicted form lose its efficacy as a representamen – be recognized as a caused sign instead of a meant sign; that is, be seen as a mere scribble? The line of separation is very thin and always changing and being re-established by the process of conventionalization.

In short then, in typography there are two sign systems overlaid, both of which are symbolic. While in the one meaning emerges largely from conventions as a system of non-iconic contiguous phonemic indicators (letters must be recognized as phonemic indicators or they cease to be letters), in the other, it is less constrained by convention because meaning emerges from invention in depiction,

which is never constrained by convention (constraint would derive from legibility, connotative symbolism, etc. which may become conventions).

In communication through graphic representation the coding variables become factors of constraint, along with cultural knowledge; no depiction of form is ever an independent sign system. For example, in the pictorial representation of a complex concept such as might be found in the context of a poem or story; people, animals, trees, and buildings must conform to the actual environment in order to establish meaning because they stand in relation to the repertoires of knowledge and belief of the viewers which have been developed through cultural encounter with these things in the environment.

While they are iconic signs, many non-iconic elements may be added to the images. And the degree to which they look like the actual objects in the landscape is a matter over which the designer has a large amount of discretionary control. Form is constrained more by the objects of the signs than in independent sign making and meaning emerges from this constraint. While these visual forms attempt to limit conceptual associations, they do so within a wide circle, extending in any or all directions proscribed by the limits of consciousness. The degree of constraint is consequently greatly influenced by the mythos of the society within which the image is intended to be seen.⁵⁶ See Colin Cherry. *On Human Communication*. MIT Press, Cambridge, 1957, p. 7.

But the circle of constraint is variable; it may also be drawn into a much smaller diameter in some instances. In the guide map of a zoo, for example. While the depiction of animals, trees, and buildings must also conform to the actual landscape, they do so with a different range of conceptual associations intended. Depicted forms must bear resemblance to the animals, trees, and buildings in the landscape more succinctly because their meaning emerges primarily through this relationship. Therefore the number and kind of visual elements are reduced in complexity, but they remain iconic signs, and the degree to which they look like the actual objects in the landscape is a matter over which the designer still has a large amount of discretionary control in the depicted forms. And constraint does not come from depiction, but from other factors.

In depiction of the map, the designer is obliged to be sensitive to the needs of people finding their way through the environment which

the map represents. *And* the reader of the map is obliged to know the rules whereby the forms were created, because the guide map is a small *closed* system existing apart from, but bracketed within, natural language. In a closed system the relation of one depicted animal must also stand in a predictable relation to all the others to maintain coherence, which again introduces constraint from convention in the system of signs.⁵⁷ ● Otto Neurath's "isotype thesaurus," designed to work into his ideas of language as a unified science as visual aids, are essentially an elaborate system of documenting statistics in pictures, in which each drawing bears formal relations to every other. Otto Neurath. *International Picture Language: The First Rules of Isotype*. Kegan Paul, London, 1936.

In short then, while the meaning of the pictorial signs of graphic representation are constrained to a greater degree by the object of their representamen than by the system of depiction, they are also constrained by the convention in the system of depiction. Generally speaking, there is a balance between sources of meaning, depending on the degree of iconicity. In signs having a high level of iconicity meaning originates from intrinsic sign characteristics, which are imitative analogies; in a low level of iconicity, or in the lack thereof, meaning originates from extrinsic sign characteristics, which are learned conventions. This may be shown schematically as in figure 17.

Two general definitions concerning sources of meaning in the form of signs can therefore be established:

⁵⁸ ● Barthes points out that E. Buyssens has put forward the terms *extrinsic semes* for unmotivated signs and *intrinsic semes* for motivated signs. These terms give a clearer indication of the relationships in question. They will be used here. (see E. Buyssens. *Les Langages et le discours, Essai de linguistique fonctionnelle dans le cadre de la sémiologie*. Office de Publicité, Brussels, 1943.)

1 *Intrinsic sign relationships* are the relationships between the depicted sign and the thing it refers to. (In visual signs this may be interpreted to be signs whose meaning emerges from depiction bearing a determinate but variable relationship to the thing referred to, as in cartography. A map would become useless if the image came to bear *no* resemblance to the object represented.)

2 *Extrinsic sign relationships* are the relationships between the concept and its depiction as a physical sign. (In visual signs this may

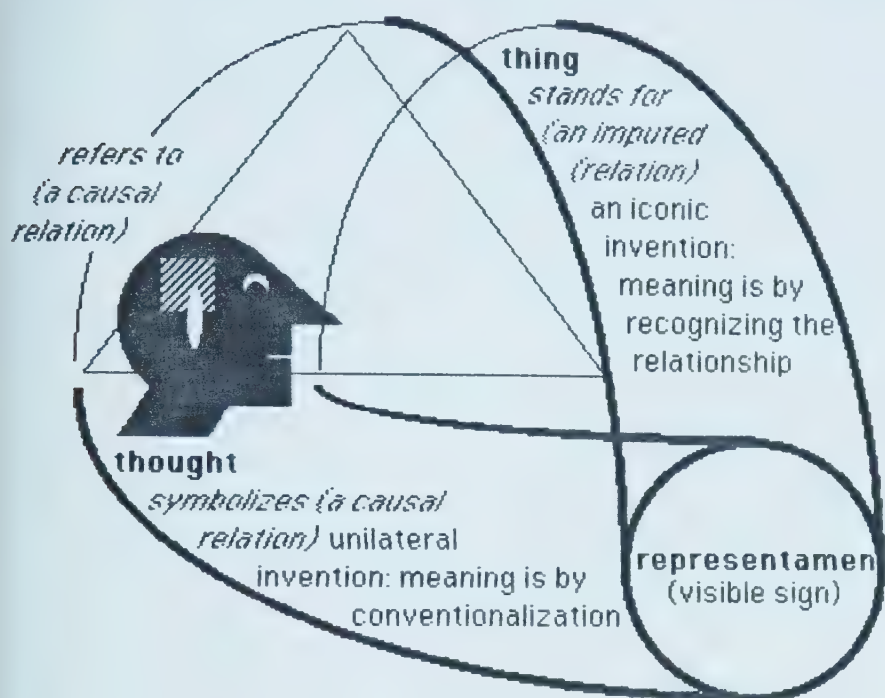


Figure 17: Sources of Meaning in Signs

Visible signs have these sources of meaning, which must be recognized when inventing signs for communication through graphic representation.

be interpreted to be signs whose meaning stems from accepted and learned sign *system* conventions. Along with the alphabet, stereotypes are an example – as the cowboy in a black hat always being the villain and the one in a white hat always the hero. They may be mere social agreements or even be prescribed by law as in traffic signs – triangles always mean caution. In contrast to a sign whose meaning stems from an intrinsic relationship, a sign whose meaning emerges from an extrinsic relationship does not look anything like the concept behind it. A triangle does not look anything like caution. Yet by convention, to a driver caution looks only like a triangle.)

In any sign system they are always a matter of degree; meaning may emerge from either source. Barthe says that, "... it will therefore be possible to have [sign] systems which are arbitrary and motivated [intrinsic], and others which are non-arbitrary and unmotivated [extrinsic]." ⁵⁹● Roland Barthes, trans. by Annette Lavers and Colin Smith. *Elements of Semiology*. Jonathan Cape, London, 1967, p. 51. In graphic representation they co-exist and co-operate. But in general *the tendency towards the extrinsic* results in symbols and "wordness" (which is the primary mental phase of signs) and *the tendency towards the intrinsic* results in icons and "pictureness" (which is the secondary mental phase and is related to physical reality by analogy). Indexes are concrete and therefore always primarily intrinsic.

"Wordness" and "pictureness," although they have different sources of meaning, are *formally* related. In this regard they may be seen to exist in a continuum. This may be shown schematically as in figure 18. On the one hand, letters, in their function as non-iconic contiguous phonemic indicators, of which word-signs are comprised can have a wide range of formal characteristics, as long as their ability to represent concepts is not contravened. Convention in history has given each letter a particular set of shapes distinctly different from the shapes of every other letter in the system, yet bearing formal characteristics in common so as to identify them as part of the same system.

Likewise, convention has given a number of formal characteristics to the entire system of indicators (that is, the entire alphabet) functioning together as representamen of word-concept which lend unity: lines may all be uniform in width or there may be thick and thin lines; there may be serifs or no serifs; there may be

brackets in the serifs or no brackets; joins may be gradual or abrupt; etc. There may or may not be a degree of ornamentation in the forms; there may even be a degree of iconicity; in which case meaning is no longer from a purely extrinsic source.

In short, in terms of form, word-signs have a relative amount of simplicity or complexity, which affects the sources of their meaning. These formal characteristics may be said to have a degree of "wordness" and a degree of "pictureness" corresponding to the extrinsic and intrinsic sources of meaning.

On the other hand, in picture-signs, there is a similar degree of "pictureness" and "wordness" corresponding to the relative amount of complexity and simplicity in the forms (their iconicity). There is an increasing degree of similarity between the formal characteristics of word-signs and those of picture-signs in direct proportion to the diminishing degree of iconicity. As the number and kind of formal elements are decreased, and their imitative quality is lost, meaning in picture-signs must emerge from conventionalized and learned sign characteristics (- intrinsic).

But the relative complexity and simplicity of form yielded by the coding properties of signs have different effects in the perception and comprehension of word-concepts than of picture-concepts. Shape distinctiveness is of much more importance in letters than in pictures because of the factors of legibility made necessary by the contiguity of letters, and their being set in lines forming blocks of text. In such a configuration each letter must maintain its distinction from every other one in the perception of the word-concept. See figure 19. Because meaning in the form of picture-signs does not exist apart from their bearing in iconicity, in pictures contiguity of form is of concern only in a *system* of picture-signs (as in the guide map), and then always in relation to the degree of iconicity. Because of their iconicity there is no factor of legibility. But in signs with very simple forms (- intrinsic), with the direct imitative quality being greatly reduced, comprehension is maintained through conventions established in the system. See figure 20. And when iconicity disappears entirely in pictures; as it might in the graphic representation of abstract data through graphs, charts, and some maps; then the scope of the system becomes the sole determining factor in meaning.⁶⁰ See Jacques Bertin, trans. by William J. Berg. *Semiology of Graphics*. University of Wisconsin Press, Madison, 1983, p. 42ff. At that point meaning becomes constrained only by convention of

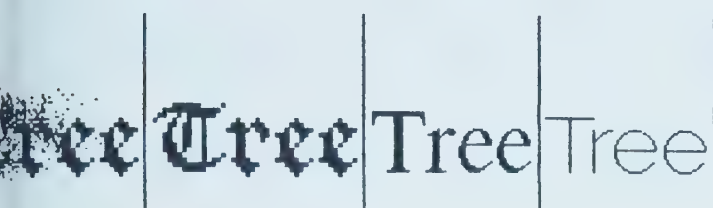
± extrinsic sign characteristics	± intrinsic sign characteristics
	
Word-signs: with more or fewer formal elements, affecting the nature of the perception and comprehension of both the non-iconic contiguous phonemic indicators of which they consist, as well as the concepts they represent.	Picture-signs: with varying degrees of iconicity yielding more or fewer formal elements, affecting the imitative quality of the signs and changing the nature of the perception and comprehension of their concepts.

Figure 18: Effects of Coding Properties

Word-sign and picture-signs are affected differently by the coding properties.

a) The meaning of word-signs stems primarily from conventions established by use. Therefore coding properties in history have lent letters certain forms (e.g. sans-serif, serifs, ornamentation). But their "pictureiness" is not so much constrained by convention and can introduce other formal elements as long as "wordness" is not contravened.

b) The meaning of picture-signs stems primarily from imitating the object of the sign. Their "pictureiness" allows meaning to emerge. Therefore they are affected by coding properties insofar as they alter their imitative quality.

But in both, the concepts themselves and the signs representing them in the communication situation, together determine the choices made in the encoding process. This affects the resultant forms and their potential to persuade.

abcde
bad cat

abcde
bad cat

Figure 19: Shape Distinctiveness

Legibility increased as the shape distinctiveness of letters is more clearly discernable.

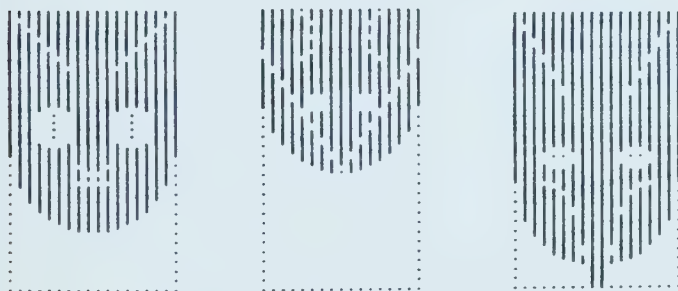


Figure 20: The Shift Towards Extrinsic Sources of Meaning
 As the iconicity of picture-signs is reduced (- intrinsic) meaning emerges more from extrinsic sources. Comprehension is maintained by conventional use of form in the system of signs constructed.

use (+ extrinsic). See figure 21. But such graphic representation is a special case; in most picture-signs there is a level of iconicity, and the relative imitation of reality aids in determining meaning.

In short, in the graphic representation of concepts meaning in depicted form has two sources, resulting in "wordness" or "pictureness", but with varying degrees of overlap between them. The inter-relationship of these sources of meaning may be shown schematically as in figure 22. All the different graphic representations possible are included in this relationship. In making communicative signs, the sign-function in the binding context will have a direct bearing on the dominant sources of their meaning.

There is therefore ambiguity present in the physical realization of concepts.

Form may be described as being *transparent* when it is not itself the subject to be considered but rather is the conduit for some other concerns. Conversely, form may be described as being *opaque* when it becomes the subject of attention, either independent of or in conjunction with, that which it is the conduit for.

In music, for example, meaning is inherent in the sound or tone, therefore the perceiver must be acutely aware of it in order to comprehend it. Hence stereophonics. It is opaque. But the perceiver is typically unaware of the individual notes that make up tonal groups, they are transparent.

So too are the phonemic sounds of the lyrics. And likewise all the phonemic indicators of language. Because their meaning originates in extrinsic sign characteristics, convention in the sign system has rendered letters (visual phonemic indicators) transparent in the comprehension of concepts. As long as there is an accepted flow from the forms of letters into word-concepts the physicality of the signs is entirely taken for granted. One is not typically aware of the shapes of letters, unless a degree of non-conventionality is introduced. This is a question concerning the shape distinctiveness of letters and the legibility of type. (See figure 19.) In a body of text, for example, the form is entirely transparent until there is a change in the convention of the text, as the introduction of italic type for a word or phrase. Then there is a momentary opacity. Because this practice is conventional, the reader recognizes the significance of it and comprehends it to mean emphasis. But the attention quickly shifts away from the opacity back to the transparency of the word-signs in the flow of concepts. If such a practice were not

conventional the apprehension of the momentary opacity would have been a mere interruption in the readability of the text.

In general a high degree of transparency in word-signs is desirable for continuous lines of word-concepts because their meaning lies in their "other side," which is their symbolisms, and not in themselves.

But there is even in the comprehension of text the "presence" of the text – the *texture*, which is not purely physical texture. Burke says there are "Distinctions between art to conceal art and art to display art . . ." ⁶¹ ● Kenneth Burke. *Counter-Statement*. University of California Press, Berkely, 1968, p. 9.

One is either painfully or pleasantly aware of the sentences as sentences – in their turn of phrase. In the "presence" of the concepts. Thus even factual "information" is not purely transparent.

By contrast "pictureness," like musical tone, is always necessarily opaque to the perceiver. But it is not purely so, it is made up of many levels of opacity and transparency interwoven by virtue of the fact that meaning emerges from both intrinsic and extrinsic sources because of the $\pm$ degree of iconicity, and the $\pm$ degree of convention and symbolism involved.

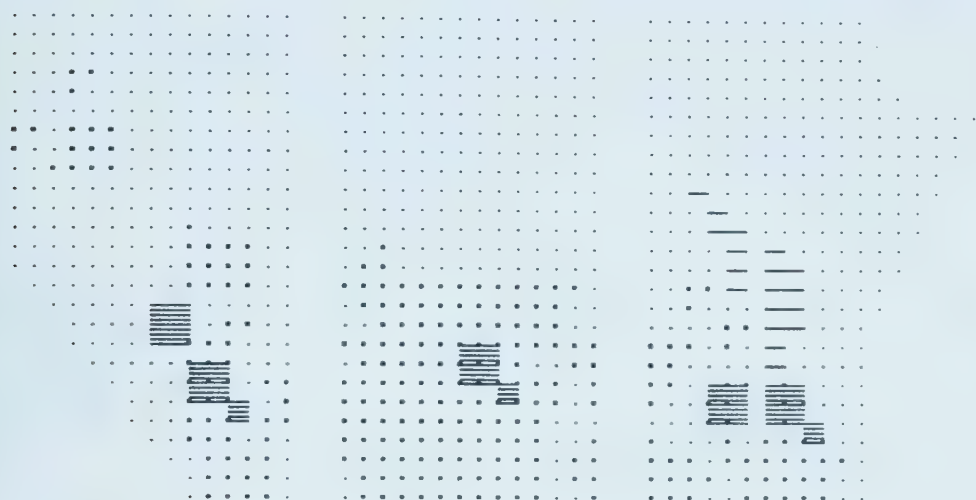


Figure 21: Obscurity

The meaning of this configuration is largely derived from extrinsic sources. Meaning remains obscure until the conventions of the formal elements are known. Only a small amount of meaning is provided from intrinsic sources by the iconicity of the larger forms. And this only to some viewers.

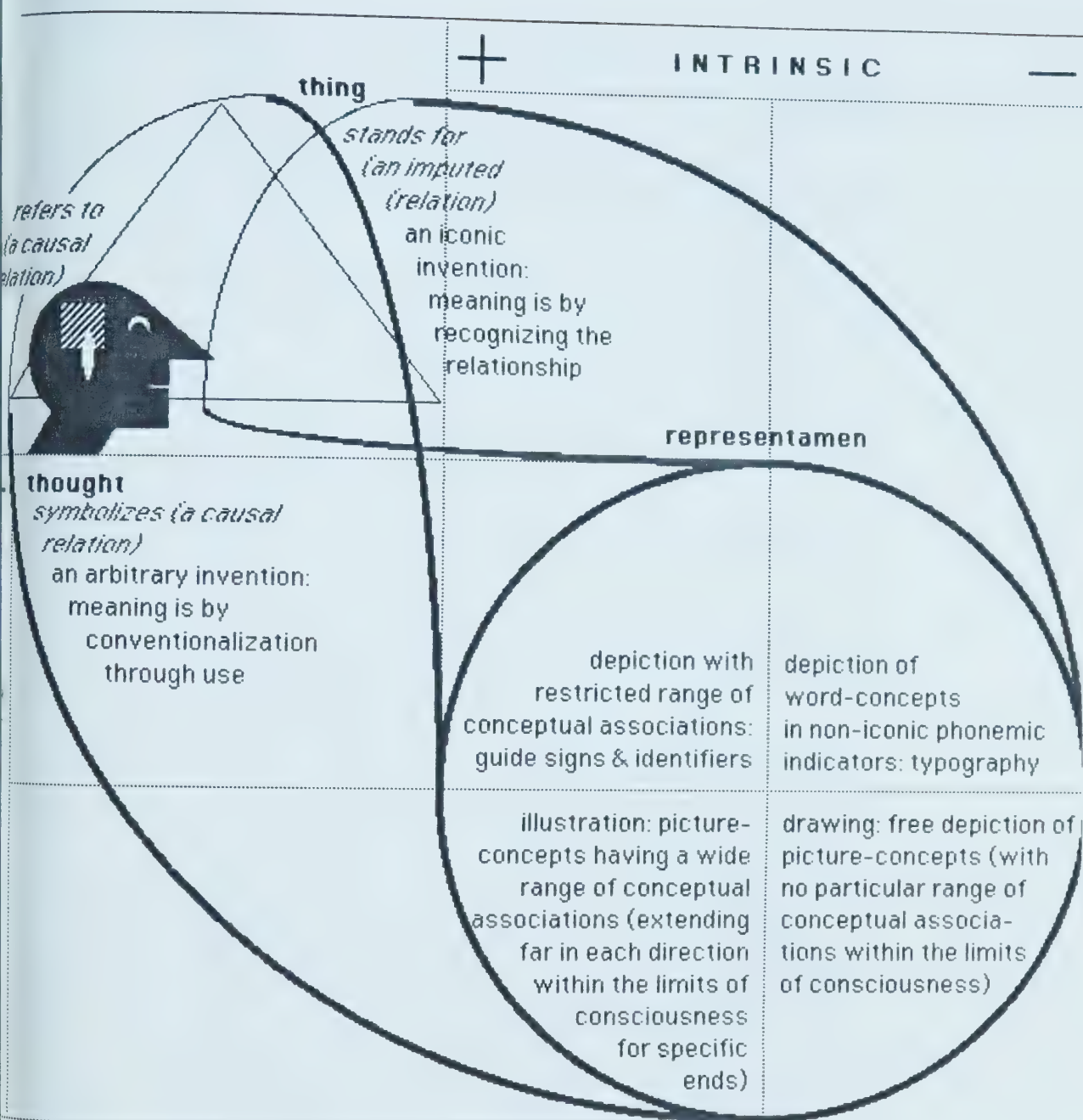


Figure 22: Inter-relationship of Intrinsic and Extrinsic Sources of Meaning
The inter-relationship of $\pm$ intrinsic and $\pm$ extrinsic sources of meaning in the communicative signs of graphic representation.

4.4 The Process of Form-Giving

The unity between "wordness" and "pictureness" is analogous to the relationship between verse and music. The unit of expression comes into being when word-concepts (verse) are put into the context of graphic representation (music) and an ambiguity (multiplicity) of meaning results. The tendency toward +extrinsic sign characteristics of word-concepts and the tendency toward +intrinsic sign characteristics of picture-concepts each supply different dimensions of the expression. Thus the unit of expression may be seen as a single interactive sign system comprised of signs in different sign classes, each of them playing a different role in the meaning process. In their co-existence the expression attains a distinctive form. But this form is variable and must be created by the communicator, which occurs through reducing the variables of the coding properties of signs.

From a pragmatic point of view, the relationship between the two aspects of form in signs introduced into my model of language becomes immediately obvious.

First, because signs must have concrete existence, as in the marks on a surface, the kind and quality of these physical entities must necessarily have a bearing on their ability to establish meaning, and therefore also on the quality of communication. The "kind" of the physicality of signs is the syntax; it is the *schematic* aspect of language. It deals with the means and the substance of signs. In graphic representation this is comprised of the basic elements of visually perceptible images: first; space, shape, and form; and second; intensity, colour, and texture.⁶² There is no need to replace these ideas with the special terms of signification theory. Sinsign, qualisign, and legisign are merely another way of saying something for which perfectly adequate natural language terms already stand: shape, texture, and composition, which form the bedrock of basic design. See Donis A. Dondis. *A primer of Visual Literacy*. MIT Press, Cambridge, 1973; Rudolph Arnheim. *Art and Visual Perception*. University of California Press, Berkeley, 1954; Johannes Itten. *The Art of Color*. Reinhold, New York, 1961; R. L. Gregory. *Eye and Brain*. McGraw-Hill, New York, 1966.

It also deals with the interconnections between signs (e.g. the placement of one word or picture in relation to another) and the formation of sign systems into larger contexts, making the whole unit of expression. (e.g. the whole configuration of a book or poster).

Second, the tri-dimensional nature of signs, interacting with the physicality of signs, plays an important function in the process of

interpretation and in establishing the levels of meaning. Through the form resulting from reducing the coding variables, the communicator is attempting to establish intentional meanings. This is the semantics of form; the *tropic* aspect of language.

Tropes, by definition, always have to do with a multiplicity of meaning. There are, therefore, both surface meanings and deeper meanings that must be discovered. Both of what Barfield called the "vehicle" and the "tenor" of expression are implied. I will re-cast these terms. More appropriate for graphic representation are the terms *denotation*, for that which is primarily represented; and *connotation*, for the deeper meanings which emerge by suggestion through the emotions, memory store, and repertoire of knowledge and belief, (through the network of implication). Both aspects are vital in efficacious communication and in their implications to the topic.

Two senses of their relationship can be identified. First is the relationship of parts to the whole. For example, in the depiction of animals in the guide map for a zoo, even if the degree of iconicity in depiction is at a reduced level, and their primary function is to denote the particular animals, by virtue of their appearing within the context of the unit of expression, they connote a great deal more than merely identifying them and their relative locations in the environment – that is, they carry additional levels of meaning concerning cultural assumptions about the various animals, their habitats, food habits, their ferocity and danger to humans, etc., which the perceiver brings to bear when confronted by the signs.

Second, it is always possible to denote the same thing with signs having quite a different range of connotations. This is so because quite different conceptual associations are possible concerning the same topic. For example, in an announcement concerning the purchase of a particular cat (a tiger), the animal might be depicted in an extreme close-up view showing only a portion of the creature's face in a particular posture with a high degree of iconicity (photography). Accompanying the image is only the word "cat." Through focus on texture and contour through light and dark modulation, exaggerating the muscle tension, lip curl, salivation, etc., a sense of awe at the intensity of the animal is connoted, casting the event in a particular light. Or, quite different connotations about the same event might exist if the image of the announcement depicted cats lounging about in the boughs of exotic looking trees some distance away in a panorama of a verdent jungle,

with a lesser degree of iconicity (line conversion, digitization), and with contented looks on their faces. Whereas these images connote different concepts, they denote the same one (the purchase of the tiger).

The question to be answered in the process of resolving the coding variables is, therefore, what range of denotative and connotative meanings is appropriate for efficacious communication in any given situation. Answering this question must be an integral part of the form-giving process.

Furthermore, the ambiguity involved in all communication (because both the sender's and the perceiver's repertoires of knowledge and belief, their emotional states, cultural background, etc. bearing on their consciousness) create an overlapping of many layers of referential, significative, and intentional meaning within a single sign, intensifying the ambiguity of both the surface meanings, and the deeper emotive elements. Therefore form attains a quality that cannot be articulated rationally. Such multiplicity in the meanings of signs results in the dense richness of poetic and artistic expression.⁶³ See Winnifred Nowottny. *The Language Poets Use*. Athlone Press, London, 1962, pp. 72ff.

George W. Digby says, "There is nothing so strange, nothing so devastating, as an encounter with a true work of art. Such experience always has a taste of the incommensurate. It is devastating in the sense that one is overwhelmed, swept off one's bearings. And yet, with the feeling of strangeness, of wonder, there is also a sense of deep significance."⁶⁴ George Wingfield Digby. "Content and Communication in the Visual Arts," *Metaphor and Symbol* ed. by L. C. Knights and Basil Cottle, Butterworth Scientific Publications, London, 1960, p. 38.

As a general principle tropes are the means whereby something is stated figuratively, that is, realized in a form which not literally means what appears. They are, in that regard, "signs," or substitutes. But practically applied they are peculiar kinds of substitutes; they are *idiomatic expression*, springing from myth and culture, and cannot be understood apart from it – that is, they make archetypal appeal. Therefore Quinn says language is, "... not like chemical engineering. We shouldn't learn the figures of speech the way we learn the periodic table of elements. We shouldn't because we are learning not about hypothetical structures in things, but about real potentialities within our language, within ourselves."⁶⁵

Arthur Quinn. *Figures of Speech*. Gibbs M. Smith Inc., Salt Lake City, 1982, p. 2.

In creating form we follow a pre-existent pattern. Dudley Bailey says,

There are clearly recognized patterns in time, and fictional techniques utilize them commonly. There are also clearly recognized patterns in space, and descriptive writers use them. . . . then there are logical patterns. From the logical conventions of induction we derive the patterns of "details" and of "illustrations." . . . From the logical conventions of categorization, we derive the patterns of definition and "logical analysis;" from logical conventions of analogy we derive patterns of comparison and contrast; from the logical conventions of causation we derive the patterns of hypothesis. From psychological conventions we derive such patterns as those of repetition and various kinds of "impressionisms."⁶⁶ Dudley Bailey. "A Plea for a Modern Set of Topoi," *College English* Vol. 26, 1964, pp. 114-15.

Burke says, "Since there are no forms of art which are not forms of experience outside of art, we may – so far as form is concerned – discuss a single poem or drama as an individuation of formal principles."⁶⁷ Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 143.

In using tropes an innate linguistic expectancy is followed. It brings a balance of denotative and connotative attributes of signs about because form is an innate attribute of thought.⁶⁸ Noam Chomsky. "Language and Mind." *Psychology Today*, 9, 1968; and Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 31 and 45-56; see also Robert M. Gorrell. "Structure in Thought," *College English* Vol. 24, 1963, pp. 592-4.

He continues, "[A trope] exemplified by specific images, is an 'individuation.' Its appeal as form resides in the fact that its particular subject-matter enables the mind to follow a metaphor-process."⁶⁹ Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 143.

The two-dimensional unit of expression acts as the scene for the re-enactment of thoughts – that is, it provides "pictureness" for the whole. In it the schematic and tropic aspects of language are distinguishable but inseparable. Carl Dair says that one can, "... of course, organize this surface the way even a pigsty is organized – by putting a fence around it. This is very effective in keeping what's inside, inside, and in keeping what's outside where it belongs. . . . Within this containing border it would be possible simply to put letters and words at random and the *space* would certainly be

articulated.”⁷⁰ ● Carl Dair. *Design With Type*. University of Toronto Press, Toronto, 1967, p. 11. My emphasis.

But in giving form to thoughts more is demanded than mere articulation of space – there must be a concomitant articulation of concepts, which can never follow the “pigsty” approach but must follow the principles of language according to the innate form of the mind. Form affects the perceiver’s emotions, memory store, repertoire of knowledge and belief, (through the network of implication) in a complex manner through the combination of denotation and connotation of signs. Ambiguity resulting from tropic and schematic form increase the complexity, but heightened ambiguity does not mean that the image is necessarily less comprehensible.⁷¹ ● See Winnifred Nowotny. *The Language Poets Use*. Athlone Press, London, 1962, pp. 72ff.

The ambiguity of form given to thoughts *create a need* in the perceiver. The task of the communicator is to draw the perceiver into the implications presented by the signs. The need can only be filled by satisfactory *comprehension*. Therefore appropriate physicality must be given to the tropes and schemes together.

Another proposition may be given:

Meaning is possible to the degree that inferences from form are supported by the network of implication.

4.4.1 Beginning the Process

I can now turn to the application of the pentad format (act, scene, agent, agency, purpose) to create the balanced combination of denotative and connotative attributes through transparent and opaque form within the *dramatic* locus of acts of communication and concepts.

Visual signs are special in their power to communicate because of the possibility of creating a special relationship (intrinsic sign characteristics) between the representamen and its object. Ogden and Richards say, “In this case the triangle is completed; its base is supplied . . . Its greater completeness does no doubt account for the immense superiority in efficiency of gesture languages, within their appropriate field, to other languages not supportable by gesture

within *their* fields. Hence we know far more perfectly what has occurred if a scene is well re-enacted than if it is merely described.”

⁷²● C.K. Ogden and I. A. Richards. *The Meaning of Meaning*. Harcourt, Brace and Company, New York, 1948, p. 12 footnote.

In the “pictureness,” of graphic representation, depiction in word-signs and depiction in picture-signs are brought together as a single visual re-enactment of thoughts through iconic and non-iconic forms in a two-dimensional space. The dialectic is not a mere exchange of concepts, but includes their visual representation through juxtaposition in the plane space of the page in a manner that follows a mental expectancy. And the dramatization of thoughts represents, and is derived from the communication situation. One might say that the drama of the graphic representation of concepts, once derived from the communication situation is added onto the actual events of people, animals, and things in it, because the subjects of the encoding process are *idioms* of expression derived from real-life and have no existence apart from it. Once encoded, signs become an integral part of the situation. They are pseudo-events in the larger eventful reality. It is a process of transformation – that is, it changes concepts from a combination of mental states and physical situations, into mediatory signs. But how is the dramatization achieved?

By way of explanation, one might say that every communication situation may be divided into primary, secondary, and tertiary components. Each has a *subject* and an *expression*. For example, a city has established a sizable zoo over a number of years; setting up a budget, purchasing animals, building artificial habitats, and landscaping the site. People have generally been aware of it through the publicity the event has received in the various news media, and they have visited it without any additional information about animals or a guide map of any kind having been provided. Only a simple sign with a minimum of information identified the site. No signs or information accompanied the exhibits. The formation of the zoo authority, along with the requisite public meetings, hiring of planners, engineers, and architects, etc. constitutes the primary subject. The zoo itself constitutes a communication between the city zoo authority and the visitors. It is the primary expression of the communication situation.

Out of this situation specific acts of communication concerning different aspects of it arise, attempting to broaden the

understanding of, motivate the use of, ease access to the zoo, etc. The making of communicative and persuasive signs is, therefore, introduced into an existing communication situation. But before any communication takes place the encoding process and the giving of form to signs must intervene. This is the secondary part of the communication situation. It too has a subject and an expression. That which was the expression of the primary part, now becomes the subject of the secondary part. The expression of the secondary part is complex and must be invented or discovered through the resolution of the coding variables, and in answering the three foundational questions, *what* can be encoded to represent a thing, *how* can it be depicted, and *with what* can it be accomplished. It is an experiment in form.

The tertiary component is the result of the experiment. Its subject is the discovered forms tentatively considered as representamen of concepts. Its expression is the denotations and connotations of the signs which emerge as levels of meaning in the percipients of the images. From the tentative images those with the most suited meanings can be retained. This three-part, successively added-on process of communication, can be shown schematically as in figure 23.

The communication situation is therefore typically complex even before specific acts of communication are planned. There is an entanglement of many small situations. Often there are situations of emotional stress and values conflict resulting from the way things are being done or left undone in the larger situation. There are particular ways in which the zoo is presented to the public which either enhance or detract from its effectiveness as a zoo.

In any given communication situation the factors of the binding context must, therefore, be analysed and necessary sign-contexts defined in working through the "added on" sequence of events. There are specific things that need to be resolved. The kind and quality of the signs to be made must be established. Therefore the relationships that exist between the schemes and the tropes must be examined. And in doing so there must be decisions made concerning the balance between +extrinsic (word-concepts) and +intrinsic (picture-concepts) sources of meaning. The comprehension of entire unit of expression will therefore be through a combination of transparent and opaque forms.

Implicit in the process of dramatization is the idea of discovering

a wide range of conceptual associations about a given topic and reducing them to a few that denote and connote effectively within the immediate context, allowing for meaning to emerge. This is a process which can be divided into two steps: first, *analysis* and second, *synthesis*. This is a “pulling apart to see what makes it tick” and “putting it back together in a way more suited to the situation” approach. It over-lays the primary, secondary, and tertiary components of the communication situation, because it is the means whereby the particular idioms of expression may be discovered and presented. Thus it is a process of discovering significant things to say; it is the discovery of a variety of perspectives. And integral with the analysis is the arriving at a definition of the situation. The “putting together” step is based upon this definition. It is a process of multiplying the perspectives and then reducing them. There is an opposition of ideas. There is a dialogue established.

Out of this two-fold process emerge discreet phases of work as follows: first, arriving at a definition of the topic at hand; second, finding tentative options of expression; third, visual transformation; and fourth, realization. The entire process may be shown schematically as in figure 24. One realizes that no phase ever really stops. In each one there must be opportunity to go back and check and change. The objective is to invent informative and persuasive form.

4.4.2 Technique

What I have outlined above is obviously a technique. Most things that are made undergo changes requiring a number of successive operations. And most things that are made require, in those operations, the use of devices external to man for their completion. The premise of language that I have postulated is that it is both rational and non-rational (despite the efforts of scientists – from within “technique” – to cast it in strictly rational terms). However, in applying means (technique in its original sense) to the physicality of signs, this rational and non-rational medium is always put *into* the context of mechanical rationality. The last question concerning the coding properties (agency – with what can the physicality of signs be made?) obviously has to do with the operational aspect of sign-making, and it involves external devices. Given the fact that communication and graphic representation are thoroughly

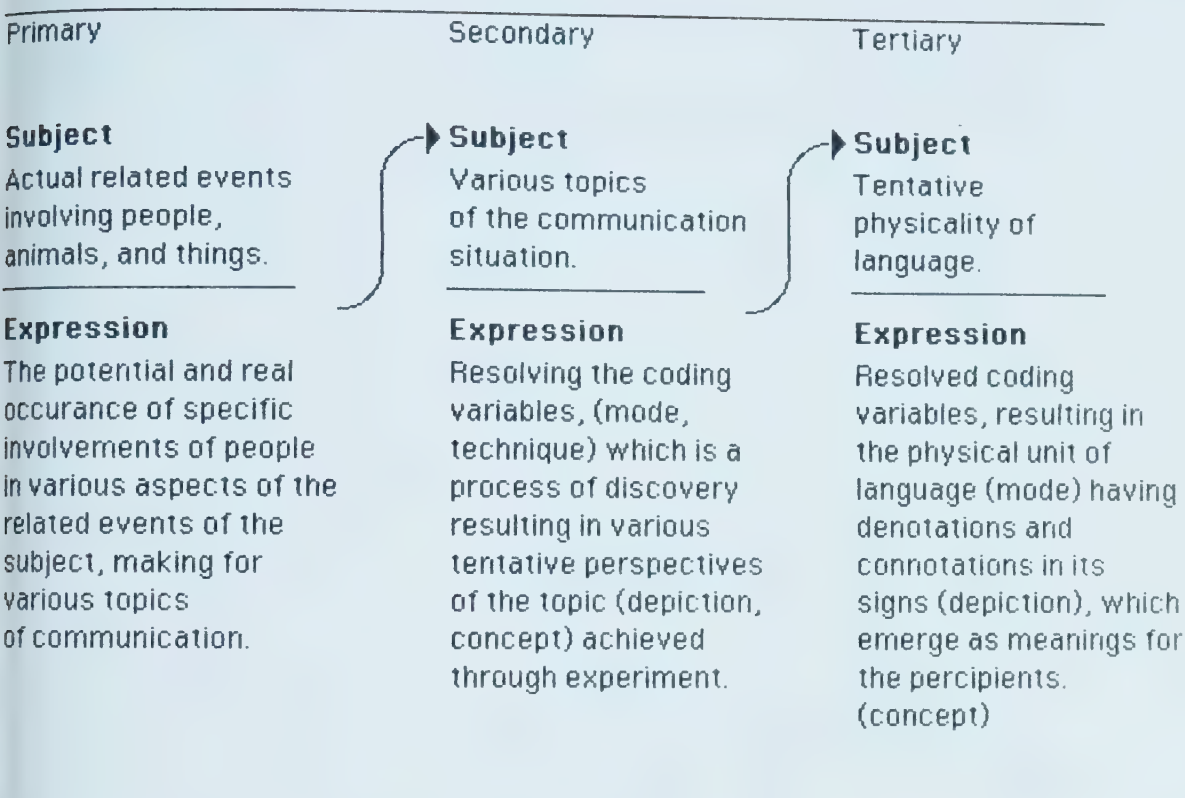


Figure 23: Cumulative Effects in Graphic Representation
The tri-part added-on nature of the process of graphic representation in the communication situation.

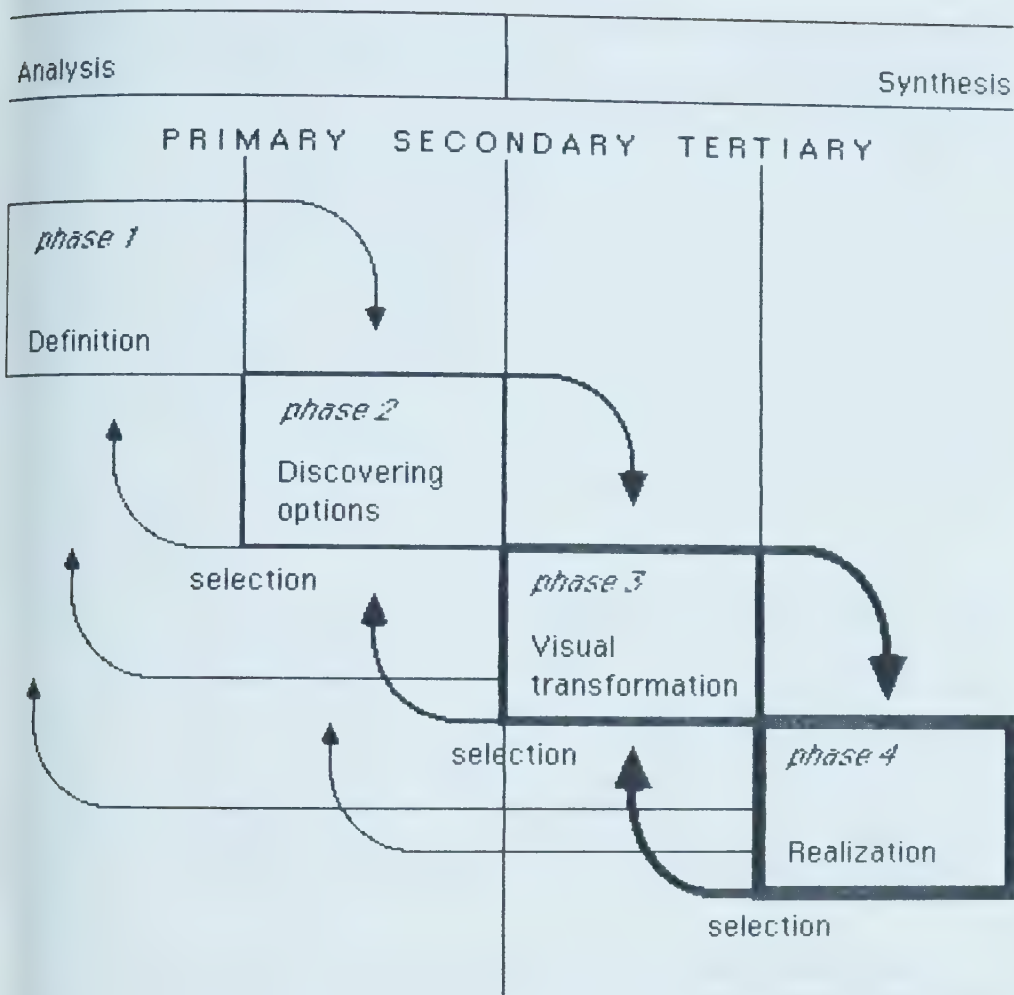


Figure 24: Form-Giving as a Two-Stage Process

Form-giving may be seen as a two-stage process, going through four discreet phases. After a certain amount of work has been completed, it is assessed in light of all previous work. Therefore each phase feeds back into every previous one. Each assessment may yield new insights, and certain ideas can be discarded in favour of others. Thus the project can proceed forward, from phase to phase, resolving the coding variables, and moving through the primary, secondary, and tertiary components of the communication situation.

technicized in our general culture, it is appropriate to deal with this last technical question first.

For the communicator expression means the complete integration of the rational and non-rational factors of language with the physicality required by mediation.

The distinction I made between hand-making and machine-making in figure 2 may give the wrong impression about the process of graphic representation. Strictly speaking, only drawing in the dirt with ones finger can be said to truly be hand-making in graphic representation (and there is not much call for that today). A better perspective is to distinguish between a high or low degree of risk to the quality of form resulting from the process of making something. To demonstrate, David Pye uses the example of drilling. He says:

Let us take two extreme examples: (A) A dentist drilling a tooth with an electrically driven drill. (B) A man drilling a piece of wood with a hand-driven wheelbrace, using a twist-drill and jig. A is a machine-operation and B is a hand-operation: or, if you like, we will say that both are machine-operations. Operation A which the dentist does with a power-driven machine-tool involves 100 per cent risk (and there is no man that it lies in the mouth to deny it!) but operation B merely involves a five per cent risk or so, and only that because, if the hand-workman is fool enough, he may break the drill. Otherwise he has only to keep winding the handle and the result is a certainty.⁷³ David Pye. *The Nature and Art of Workmanship*. Cambridge University Press, Cambridge, 1968, p. 9.

Devices external to man all require a degree of skill by their operators in their achieving some intended results. But the skills required differ in kind in direct proportion to the degree of certainty (in achieving the intended results) that the tool provides in its operation. The more certainty inherent in a machine the less the operator need be concerned with the problem of *guiding* the tool. Guiding and jiggling are built-in characteristics.

The invention of printing from movable type introduced an element of certainty into the making of word-signs. No longer were writing skills synonymous with calligraphic skills (which have primarily to do with the guidance of the pen on the page) and are operations of high risk. Once punches had been made (operations of high risk), the type cast (operations of low risk, especially with a mechanical typesetter), set squarely and evenly, and uniformly inked and impressed (operations of low risk), the true and uniform

reproduction of letters in every copy was assured. In general, mass producing had this effect: the technology required to achieve something attempted to reduce the element of risk in workmanship. New technology is the end result of a long history of seeking to reduce risk in the process of making things, including, of course, the graphic representation of concepts. This low-risk making process is what every communicator has access to in the personal reproduction technology – that is, in devices like personal computers, (as well as photocopiers, polaroid cameras, scanners, and laser printers). Quite ironically, where “technique” demands ever more highly specialized skills in every field, with these devices the practice of form-giving leaves the area of specialization and is put into the hands of ordinary non-specialist communicators, bypassing the cumbersome technology of the traditional printing trade (with its specialized skills, divisions of labour, etc.). It puts the responsibility of form-giving in the hands of each individual sitting down at a personal computer intent on composing a document, and it necessitates a means of more inclusive (conceptual and physical) language-use than has hitherto been practiced.

With the invention of printing from movable type, form became less dependent on the vagaries of the skills and the diversity of the personalities of the communicators.⁷⁴ ● For a discussion of the transition and gradual elimination of scribal characteristics (like ligatures) from the type fonts, see Harry Carter, *A View of Early Typography*, Oxford University Press, Oxford, 1969; and E. P. Goldschmidt, *The Printed Book of the Renaissance*, Cambridge University Press, Cambridge, 1950.

This affected the style of reading material in three ways.

First. It made form in the page adhere to the right-angled character of the type-metal and the linear sequential nature of set lines. The communicator could not easily contravene this “squareness” for the positioning of elements in the page, rather the opposite effect was more common – letterpress demanded solutions to the composition of pages according to its constraints.

⁷⁵ ● The Linotype, invented by Ottmar Mergenthaler in 1884 and the Monotype, invented in 1887 by Tolbert Lanston, required for their operation that the typographic elements be arranged according to a logical scheme. The organization of fonts into letters, numerals, punctuation, and special characters according to families in medium, bold, and italic versions; and the further setting in horizontally oriented lines in vertical columns, all contributed to the way in which concepts came to be interpreted visually. Pictures and other visual elements (cuts) came to be placed *into* the columnar page. Non-verbal elements are separated from the typographic ones because of the

different techniques employed in their creation. What brought them together again was the *arrangement* of the page (which followed the regimen of the mechanical method).

This in turn yielded the second effect.

The organization of thoughts became rationalized beyond the degree of rationality with which language is naturally imbued. Eisenstein says, "Uniformity and synchronization have become so common since the advent of printing, that we have to remind ourselves repeatedly that they were usually absent in the age of scribes." ⁷⁶ ● Elizabeth Eisenstein. *The Printing Press as an Agent of Change*. Cambridge University Press, Cambridge, 1979, p. 16.

The potential systematic relationships are judged more functional (rational) than the intrinsic characteristics of individual subjects. Figure 25 shows an extreme example. It has afforded reading material increased transparency, where no "personality" of the subject was allowed visual expression. This created a separation of "text" from "display" typography and affected the third stylistic characteristic.

Beginning in the nineteenth century (concurrent with the machine setting of type) and continuing to the present, there have been different premises on which the form of text and display have been based. With an increasing demand for public notices in which individual subjects are the key concepts to be communicated, a visual display style (that simulates the conceptual arrangement of aural language) has emerged, with its non-uniform, interrupted, repetitious, gesticulated dramatization – that is, a style in which the text and display co-operate – through changes in type sizes and styles, with important words set much larger in vernacular faces approximating their emotional content, and factual information set in smaller more objective faces. The advent of photography has further increased the dramatic quality. Furthermore, as "technique" became increasingly more universal with the turn of the century, there was a genuine reaction spawned by rationalism.

Showing directly in non-illusionary (concrete) fashion the world being created by "technique," there were various artists who explored "impressionistic" typography and collage to give "pure feeling" or "direct perception" to the printed page. For example the constructivists and the futurists. ⁷⁷ ● While both of these "isms" of art are materialist, in the constructivist view, the world is a cosmic space out of which a piece can be sliced, configured into strips and planes, variously textured and coloured, yet remain fully interlocked. Form is a unified but

divisible substance. Futurists see form, not in physical structures, but as dynamic fields existing in an "ever-fluid confluence"—Boccioni's field theory. Transition from one field into another is characteristic, implying motion and speed exhibiting the impression of multiple transitions. But both exhibit a "concretization" of the image in which meaning emerges from non-iconic sources — non-objectivity.⁷⁸ See J.I. Martin, et al, ed. *Circle: International Survey of Constructive Art* Praeger, New York, 1971; and Rosa Trillo Clough. *Futurism* Philosophical Library, New York, 1961.

Alvin Coburn's photographs of New York, exhibited in London in 1913 pioneered the use of photography to express this notion; this was followed by the now famous work of Christian Schad, Man Ray, and Laszlo Moholy-Nagy. During these years when mechanized typography and photography first appeared together, there was an attempt made to break the constraint of letterpress. Exemplary is the work of Alexander Rodchenko, who came into contact with the futurists at a young age and later became a strong proponent of constructivism on Russia; and El Lissitzky, who attempted a synthesis of futurist and constructivist ideas which he called an "interchange station," evident in his prouns. These two individuals, among others, created pages having strongly moving planes in different directions with type and pictorial elements tightly integrated. See figures 26 and 27.

The invention of photography also affected letterpress printing. The technique of lithographic printing had been known and widely applied to specialized tasks ever since its invention in 1796 by the Bavarian playwright and inventor Aloys Senefelder. In 1852 two frenchmen, Lerebours and Lemercier, collaborated to produce the first photo-lithographic images. But lithography could not be used for reproduction in any quantity because the abbrasive nature of the materials led to the rapid destruction of the image. But in 1904 Ira Rubel invented an intermediary surface to which the image could be "offset," greatly extending the life of the image, and ever since photo-offset has steadily replaced letterpress in almost every application as the standard means of reproduction.

And photography, of course, is not constrained by the "squareness" of letterpress composition. Therefore the dynamic compositions of integrated typographic and pictorial elements can more easily be accommodated. Since the late 1960's, working with the unrestricted page integrating typographic and pictorial elements, Wolfgang Winegart has shown the full potential of photography as an expressive medium. Elements can be positioned in any directional

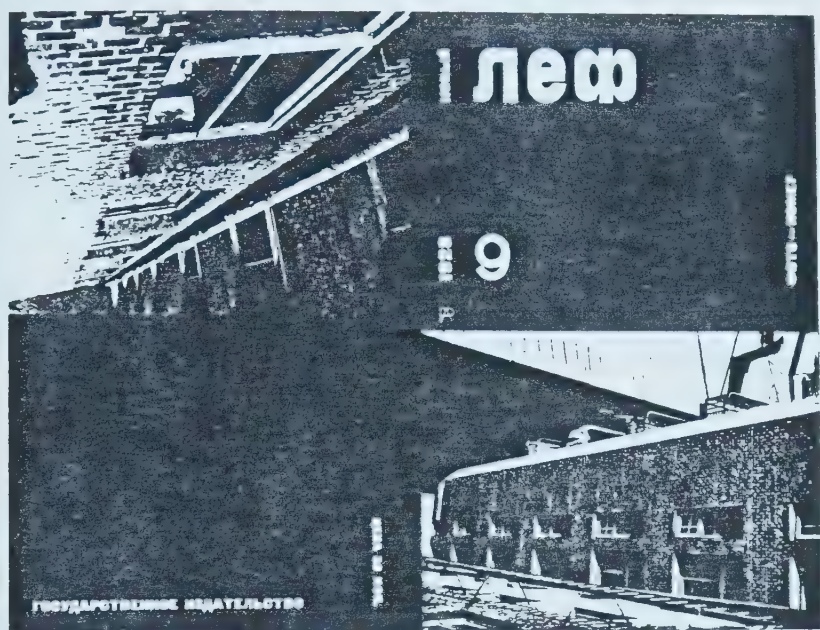


Figure 25: Extreme Rationalism in Form

An example of extreme systematization. No personality of individual subjects is allowed (apart from the extrinsic sign characteristics) to disrupt the pristine logic of the three systems shown.



Figure 26: Integration of Word-Signs and Picture-Signs
A complete integration of words and pictures is endemic to the photographic reproduction process, shown by this now famous poster of 1924 by El Lissitsky.



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Figure 27: Integration of Word-Signs and Picture-Signs
 Acutely angled photographs and foreshortened viewpoints, combined
 with typographic elements, make for dynamic page compositions in this
 1928 work of Alexander Rodchenko.

orientation whatsoever; film introduces positive and negative image possibilities; there is a natural ability to enlarge or reduce elements at will; and there are variable screens and contrast controls to affect the image. In new (more personal) technology the freedom of photography is undergoing change. Photo-sensitive emulsion is being replaced by electro-chemical substances. The entire dark-room is eliminated. The grain of the film and the half-tone screen are being replaced by the pixel (picture element). These two factors together produce the constraint of the new medium. See figure 28.

Although little or no type is any longer set by Linotype or Monotype, and little printing is done by letterpress, much language-use, however, still follows its regimen. Indeed, there have been, throughout this century, two schools of thought, one following "technique" (consequently being more rational) and the other rebelling against it (making it much more companionable to the attributes of natural language).

All technological development represents an attempt to increase the degree of certainty in the intended result. In this sense all the mechanical inventions mentioned represent a reduction in risk and an increased certainty in the image, but their invention was within the paradigm of the division of labour found in the production plant. However, quite unintentionally, as the degree of risk decreased the devices moved out of the specializations in which they originated (the camera reduced the degree of risk in the image-making process to the degree where everyone is a picture-maker. And in the new technology there is such a large amount of certainty built in, that making it personal is endemic to it). Therefore new technology clearly creates the possibility of visual style containing equivalents of natural language with a high degree of certainty being assured in the process of graphic representation, and because this technology is personal it is imperative that this potential be realized by the individuals using it. Which brings me to the first step in the process.

4.4.3 Analysis

The first step of every rhetorical act of communication is what the classicists referred to as *inventia*. I stated earlier (section 2.2) that in the new rhetoric expression is wrapped up in invention, and it is from this premise that one can proceed. Before communication can occur there must be a context established within which ideas may exist. This context must be discovered or invented from within the

communication situation. The problems of *dispositio* and *elocutio* come to be addressed in the process. And appropriate expression may emerge.

The very first requirement is that preconceptions be put aside, so that the topic at hand can be examined in new light, and be encoded in a fresh manner having a distinctive form that will render it persuasive and memorable to the perceiver. Koberg and Bagnall say,

Most of us know much more about things than we give ourselves credit for knowing. We may back off when asked what we know about something we imagine not to have examined carefully before, only to discover, upon examination, that we knew much of it. . . . This method requires writing down all that you know about the subject in question. You must *force it out of yourself*, though, because you are naturally reluctant to write down the "obvious."⁷⁹ • Don Koberg and Jim Bagnall. *Universal Traveler: A Soft-System Guide to Creativity, Problem-Solving, and the Process of Reaching Goals*. Wm. Kaufmann, Inc., Los Altos, 1974, p. 51. My emphasis.

The topic must therefore be *consciously* (rationally, emotively) and variously examined to establish new insights about it. Burke says that in the process one must follow a naturally given inquisitive procedure (things are lifted, smelled, tasted, tapped, held in different light, subjected to different pressures, divided, matched, contrasted, etc.) to establish attributes of their being. "Indeed, in keeping with the older theory of realism [poetic realism] . . . we could say that characters possess *degrees of being* in proportion to the varieties of perspectives from which they can with justice be perceived. Thus we could say that plants have "more being" than minerals, animals have more being than plants, and men have more being than animals, because each higher order admits and requires a new dimension of terms not literally relevant to the lower orders."

⁸⁰ • Kenneth Burke. *A Grammar of Motives*. University of California Press, Berkeley, 1969, p. 504.

All lower orders are drawn into the higher, and ultimately must be seen in human terms (*logos, pathos, and ethos*). Therefore objective reality must be scrutinized from *as many perspectives as the topic allows and the situation demands*. We must attempt to see things in terms of something else (that is, apply a metaphor-process) by considering them in as many terms as possible. A "dialogue" must be begun, throwing out as many perspectives as necessary for the situation, to be *tentatively* considered for purposes of experiment.

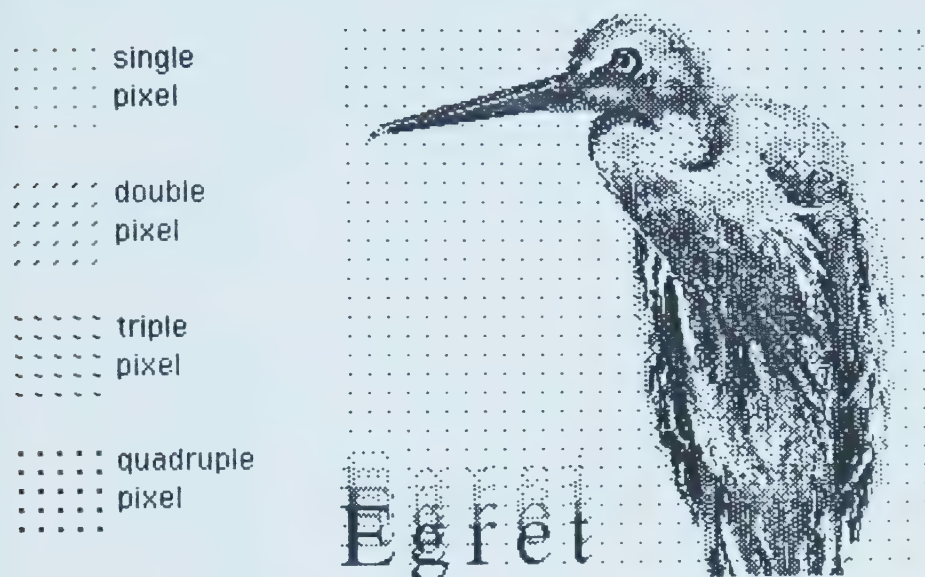


Figure 28: The Nature of Digitization

A schematic demonstration of the basic picture element of a digitally made image. There is no distinction between pixels that comprise typographic and pictorial components of an image. On the CRT screen the pixel is a square dot. In print it is either square or round depending on the output device used. The size of the dot too is dependent on the output device. The holism afforded by digitization is at once a freedom in composition and a constraint in the manner of depiction (especially significant to the latter is the factor of resolution).

● For a discussion of the effects of digitization on typography see Charles Bigelow and Jonathan Seybold. "Aesthetics vs. Technology," Part 1, *The Seybold Report*. Vol. 10, No. 24, 1981, and Part 2, Vol. 11, No. 11, 1982.

Having established the holism of language, and the essence of picture-concepts within the context of word-concepts in consciousness, it is essential for every act of communication to begin as verbal conceptualizations. Morton Garchik says, "If you are an artist, the first step is learning to think before using your pencil; and then, to use your pencil for writing before you begin to draw. If you start to draw before you think, you will tend to draw your old ideas. We are all habituated to the use of that which we already know."⁸¹ ● Morton Garchik. *Creative Visual Thinking*. Art Director Book Co., New York, 1982, p. 1.

Definition: The first task of analysis is, therefore, to write "around" the topic in an investigative manner in order to establish its context and to provide a background, beginning with what you already know, and then to discover that which you do not know. A good rhetor must depend on all available sources for information. The objective of this task is to discover attributes of everything relevant to the communication situation.

Attributes are the different categories into which physical, psychological, and social characteristics of things in general can be placed. (Physical attributes are: size, weight, mass, movement, speed, structure, colour, texture, order, etc.; psychological are: appearance, perceptual stimulus, symbolism, time, etc.; and social are: group acceptance, values, responsibilities, politics, functions, ecological values, etc.)⁸² ● See Don Koeborg and Jim Bagnall. *Universal Traveler: A Soft-System Guide to Creativity, Problem-Solving, and the Process of Reaching Goals*. Wm. Kaufmann, Inc., Los Altos, 1974, p. 51.

This inquiry provides a close scrutiny of the binding context and results in a definition of the communication problem and establishes the characteristics of the important players and the nature of various procedures and activities in the communication situation. This can be accomplished by utilizing the pentad-format as the basis for questioning as follows:

Act – All the current, intended, and potential actions of the people involved. **What?**

Scene – The setting and its implications on that which is within it and that within which it is situated: physical, psychological, and social. **Where?**

Agent – The people involved and their personality characteristics:

physically, psychologically, and socially. Who?

Agency – Using things in general and communications in particular to achieve something: physically, psychologically, and socially. With what?

Purpose – The end result of the communication situation and what affect it has: physically, psychologically, and socially. Why?

Upon completing the questions a background definition has begun to unfold, in which relevant details have been assigned to the binding context, and which has also already engaged the process of discovering options for form-giving. A better understanding of the primary component of the communication situation has been ascertained. This description can be as brief or as elaborate as the communication situation warrants or time and financial resources permit. Even the briefest of answers to each of the points in the pentad provides a starting point for further work and may be all that is required for simpler acts of communication.

Discovering options: With the description begun, it is necessary to search for “linguistic facts” or key-words⁸³ ● See Kenneth Burke. “Fact, Inference, and Proof in the Analysis of Literary Symbolism,” in *Symbols and Values: An Initial Study*, Lyman Bryson, Louis Finkelstein, R.M. MacIver, and Richard McKeon, ed., Harper & Brothers, New York, 1954, pp. 283-4. that pertain to various aspects of the communication situation. The objective in finding these concepts is to discover potentially unique conceptual associations and deeper levels of meaning, and “... ‘to make clear all elements of inference or interpretation’ and ‘offer a rationale’ for them by ‘studying the “facts”’ of each such identical term as it ‘recurs in changing contexts.’”⁸⁴ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 83. They may be found by applying a naming principle⁸⁵ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 84. to this phase of the process, which helps to crystallize concepts. Titles are given to as many of the attributes (physical, psychological, social, ecological, etc.) that have been ascertained in the definition as are deemed necessary, beginning with the more general and moving down to the more specific and down to the least significant, “to force ... [oneself] to decide what might be the essence of each step of the total development ...”⁸⁶ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 84, footnote.

An attempt should be made to express these in as specific and

descriptive terms as possible. The result is an index that has terms and "images" describing attributes of the various people, animals, and things and their relationships in the communication situation. It is also necessary to add things to the index by noting feelings and impressions. One can respond to the list itself, making "word associations," and recording anything that comes to mind. Brainstorming. (All preconceptions are to be avoided.)⁸⁷ ● See Alex Osborn. *Applied Imagination*. Scribners Sons, New York, 19. This list becomes the basis for communicative options, now tentatively considered for further experimental work.

In order to discover yet more options, it is possible to make a matrix and plot each of the terms in the list on both of its axes. This will provide an easy means of finding all the potential inter-relationships.⁸⁸ ● See Ed Bedno. "A Program for Developing Visual Symbols." *Visible Language*. Vol. 6, 1972, pp. 355-63; see also Don Koberg and Jim Bagnall. *Universal Traveler: A Soft-System Guide to Creativity, Problem-Solving, and the Process of Reaching Goals*. Wm. Kaufmann, Inc., Los Altos, 1974, p. 54 and 68.

Obviously many absurdities occur, but also unexpected attributes emerge, which may be usefully translated into tropic or schematic form later on in the process. Out of the matrix, other descriptions and definitions may be suggested, and can be added to the growing master-list. If the definition is sufficiently elaborate descriptions of attributes concerning the mode, technique, depiction, and possible concepts begin to emerge. The first question concerning the coding variables (the act – what does one select to represent a thing or an idea?) is now in the process of being answered.

Up until this point all judgement has been deferred, but the next phase requires some discretion.

4.4.4 Synthesis

The second task is to *transform* this index of concepts into graphic representation that will be comprehensible to the audience. From the verbal definition of the case, with a battery of tentative perspectives, visual concepts can be developed by exploring both intrinsic and extrinsic sources of meaning. This is the heart of form-giving through graphic encoding. Because language exists by metaphoric extension there is a confluence of the internal mental patterns of concept processing and *expectancy* in perception, and form must follow accordingly. There are basic arrangements or

processes, like stages of existence, seasons, and the contrasts of opposites (which may be expanded to include crescendo, balance, repetition, comparison, disclosure, reversal, and magnification, etc.), which all expression must follow in its physical realization. They are the made forms, consequently Burke calls them *technical forms*.⁸⁹ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 31 and 45-56.

Therefore the application of technique to forms (following the deeper given pattern) are, "an arousing and fulfillment of desires. A work has form in so far as one part of it leads . . . to anticipate another part, to be gratified by the sequence."⁹⁰ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 124. Fogarty adds, "When the technical form does not follow these patterns of expectancy in some way or another, the literary product can be said to have poor form or no form at all."⁹¹ ● Daniel Fogarty. *Roots for a New Rhetoric*. Russell and Russell, New York, 1968, p. 78. Form gives the ambiguity of language its coherence. Out of Burke's *Lexicon Rhetoricae*.⁹² ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 124ff. five kinds of form may be identified as being generally applicable to any communication. They are as follows:

1 *Syllogistic Progression* is the orderly step-by-step form of logic. Burke says, "We call it syllogistic because, given certain things, certain things must follow, the premise forcing the conclusion."⁹³ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 124.

It is the form of a well constructed argument in which "The arrows of our desires are turned in a certain direction, and the plot follows the direction of the arrows."⁹⁴ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 124.

For example, the stating of time in an announcement is followed by the stating of place.

2 *Qualitative Progression* is the introduction of a particular quality that prepares the percipient to receive another quality. For example, introducing a particular hue is preparatory to introducing its compliment, or completeness for beginning disintegration, darkness for the emergence of light, etc.

3 *Repetitive Form* is the restating of the same thing in new ways.

It is the only way of physically realizing anything, it is "... the restatement of a theme by new details, [it] is basic to any work of art, or to any other kind of orientation, for that matter. It is our only method of 'talking on the subject'" ⁹⁵ ● Kenneth Burke.

Counter-Statement University of California Press, Berkely, 1968, p. 125.

A single theme may, therefore, be maintained in a number of images each of which has different connotations, or *vica versa*

4 *Conventional Form* "involves to some degree the appeal of form as form." ⁹⁶ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 126.

There is a pre-orientation provided by convention. In the playing of an overture there is a certain anticipation of what follows, and in the playing of a finalé there is a sense of conclusion. Expectancies exist in books, posters, timetables, guide signs, etc. It is "categorical expectancy ... That is, whereas the anticipations and gratifications of progressive and repetitive form arise during the process of reading, the expectations of conventional form may be anterior to the reading." ⁹⁷ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 126.

5 *Incidental Form* are expectancies aroused by the artist as particular incidents of progressive, repetitive, or conventional form. All the tropes of language fall into this category. Monologues, vignettes, illustrations, and sub-plots also fall into this category. They may be separated from the greater form of the whole unit of expression and be enjoyed for what they are "in themselves."

Form and the unit of expression are therefore one and the same thing; form, appearing through the dramatic physical realization of concepts results in the coherence of expression. Through form the fluidity and ambiguity of language comes within the control of the communicator, and within it the range of conceptual associations can be appropriately limited. "Form, having to do with the creation and gratification of needs, is 'correct' insofar as it gratifies the needs it creates. The appeal of the form in this sense is obvious: form *is* the appeal." ⁹⁸ ● Kenneth Burke. *Counter-Statement* University of California Press, Berkely, 1968, p. 138.

And the appeal addresses the three fundamental attributes of whereby individuals perceive things, *logos*, *pathos*, and *ethos*

Superficially form or style may undergo quite rapid changes in following popular trends. It may be manifest as decoration or a lack thereof, however trends dictate. But its deep-seated connection to innate form and the other factors of the coding properties in relation to the binding factors also gives it a degree of constancy. "It is another of the available means of persuasion, another of the means of arousing the appropriate emotional response in the audience, and another of the means of establishing the proper ethical image."⁹⁹ ● Edward P. J. Corbett. *Classical Rhetoric for the Modern Student*. Oxford University Press, New York, 1965, p. 385.

Both the constancy and the changability of depiction must therefore be acknowledged in graphic representation in order for form to satisfy the need it creates and make the expression complete.

Whereas the scientific approach to language would attempt to rid it of significant form in the pursuit of facts, seeing it as a pure conduit able to provide pure factual "information," there is in practice no such purity. Language is both denotative and connotative. Language has a degree of ambiguity because no concepts are limited to single words and no words have definitive meaning. Koberg and Bagnall say, "Words don't have meanings; only people have meanings. People use words to express *their* meanings."¹⁰⁰ ● Don Koberg and Jim Bagnall. *The Universal Traveler: A Soft-System Guide to Creativity, Problem-solving and the Process of Reaching Goals*. Wm. Kaufmann Inc., Los Altos, 1974, p.62. My emphasis.

Burke says that form and information must co-exist, but, "There is, obviously, no 'right' proportion of the two."¹⁰¹ ● Kenneth Burke. *Counter-Statement*. University of California Press, Berkely, 1968, p. 144. Meaning in form emerges only where thought and action meet. Therefore it is only in paying due attention to the five kinds of *form* in the sign systems (within the context of the communication situation) that the ambiguity of language is functional, and becomes the means whereby it is possible to make an appeal to the whole personality, because its tractibility through reasonableness (*docere*), its motivation through stirred or aroused emotions (*movere*), and its attaining a sense of satisfaction or completion through its identity with the greater reality (*delectare*), demand it.

Visual transformation Form is how any made thing appears.

Depiction is the appearance of communicative signs. Its efficacy is what the classicists called *elacutia*. Through it appeal is made to the sensibilities of the audience. I have established the pragmatic locus

of communication, therefore depiction must take three things into account: first *aptum* – the appropriateness of the image in relation to the subject, the ends to be achieved, context, culture, and technology, as well as form as aesthetic experience. Second *puritas* – the correctness of form resulting in its ability to attract attention to itself. This demands a manipulation of visual properties and the creation of the unexpected. It is in that regard opposite to appropriateness. It keeps imagery from becoming boring resulting in the disinterest of the audience. In resolving the coding variables there is a dialectic of appropriateness and attractiveness. And third *perspicuitas* – the comprehensibility of concepts mediated by the form. Comprehension will only occur if the sensibilities of the audience are duly respected in the quest for attention, and the perceivers can satisfactorily resolve their cognitive dissonance. It acts to temper the dramatic process.

This leads to the second question concerning coding variables (the created scene – how does one depict the representation?). Depiction, following the innate pattern of thought, is the locus of communication, and because it follows from the definition of the communication situation, in depiction the problems of *dispositio*, and *elocutio* combine.

Two senses of depiction or form may be identified (because communication through graphic representation typically consists of “wordness” and “pictureness”): first, form in word-signs (which divides into two kinds, word-use or diction, and word representation in typography); and second, form in picture-signs. Depiction is therefore the result of an experiment in combining word-concepts and picture-concepts, and is accomplished by:

- (a) either representing them typographically in word-signs (+extrinsic), which are inherently denotative and connotative and thereby both literal and figurative, or,
- (b) directly picturing the concepts with varying degrees of iconicity (±intrinsic) or,
- (c) representing them figuratively (-intrinsic) with varying degrees of iconicity, or
- (d) any combinations of them,

juxtaposing them schematically in the unit of expression according to thought groupings.

Word-use, apart from my general argument from the perspective of language, is beyond the scope of this study, but an outline can be

provided within which its general features may be obtained.¹⁰² ●

Adapted from Edward P. J. Corbett. *Classical Rhetoric for the Modern Student*. Oxford University Press, New York, 1965, pp. 408-9.

- 1 Kind of diction
 - denotative (referential)/connotative (emotive)
 - general/specific
 - concrete/abstract
 - formal/informal
 - common words/jargon
- 2 Kinds of sentences
 - function: statement, question, command, exclamation
 - grammar: simple, compound, complex, compound-complex
 - rhetoric: loose, periodic, balanced, antithetical (dialectic)
- 3 Length of sentences
 - (the number of words)
- 4 Sentence patterning
 - inversions
 - sentence openers
 - method and location of expansion
- 5 Means of articulation
 - (coherence devices)
- 6 Use of rhetorical figures
 - (kind and frequency)
- 7 Thought grouping
 - length of paragraphs (number of words, number of sentences)
 - kind of development or movement in paragraphs
 - use of transitional devices

Efficacious communication through graphic representation, of course, presupposes the harmonious combination of word-signs and picture-signs. And in some points they overlap, particularly in denotation/connotation, the use of rhetorical figures (tropes), and (especially) in thought grouping, which for my purposes combines

the schemes of language and the disposition of the whole unit of expression. Word representation by typography is the means of the over-lap, because it is the "picture-ness" of word-concepts. John R. Biggs has called it "visual elocution." He says,

But typography also has an affinity with the art of the actor. Both are interpretive arts that convey ideas in the *form* of words from the mind of the author to the mind of the reader or listener. The nature of words, whether commonplace or noble, whether solemn or frivolous, whether trite or profound, whether cold or emotional, will govern the actor's manner of delivery, and affect the pitch, tempo and timbre of his voice, the length of his pauses, and influence his posture and gesture. The typographer, by means of spacing, weight or degree of blackness of type, size of letters, choice of capitals, lower-case and italic, may similarly create a *form* appropriate to the quality and spirit of the words.¹⁰³ • John R. Biggs. *Basic Typography*. Faber and Faber, London, 1968, p. 8. My emphasis.

For my purposes, from the position of dramatizing concepts, this form includes all of the visual components in the unit of expression, and the elocution extends to include all graphic representation. Therefore the two senses of depiction will be considered together, making the visual transformation an experiment in all relevant form (based on information gathered in analysis) which may ultimately result in the discovery of appropriateness, attractiveness, and comprehensibility of the unit of expression.

The incidental forms, which are the "idioms" or "figures" in the expression, are derived from the communication situation through the process of analysis. They are not ready-made expressions, but are language concepts which must be given life through the context of the specific situation. Using the four master-tropes as a guide some of the "figures of rhetoric" which lend themselves to visualization may be outlined as follows:

1 Perspectives (metaphoric extension)

Metaphor— a figure by which a concept is transferred from one object onto another (which is actually unlike it), so as to imply comparison.

e.g. The candy counter in the corner drugstore was a magnet to the neighbourhood youngsters.

Personification— a figure that regards or represents (an abstraction or inanimate thing) as possessing the attributes of a human being; to symbolize by a human figure.

e.g. The ground thirsts for rain.

2 Representations (synecdochic substitution)

Synecdochy— a figure by which a part is substituted for the whole or the whole is substituted for the part.

e.g. During the storm all hands were called on deck.

Metonymy— a figure (a special kind of synecdoche) in which one concept that is greater or lesser is substituted for another so as to effect a change in the quality of the concept, as the material for the thing made, or the effect for the cause.

e.g. He sailed his bark across the mighty sea.

3 Reduction/Expansion (metonymic qualitative shift)

Hyperbole— a figure expressing far more than is literally the case; an exaggeration.

e.g. The hiker's boots weighed a ton.

Amplification— extension of concepts for purposes of diffuseness through assembling diverse particularities of a subject.

e.g. Language is ideation. Ideas in action in individuals is drama. And the substance of drama is irony. There is a dialectic drama of opposites which operates through metaphoric extension, creating a synecdochic substitution of concepts, and results in the comprehension of metonymic attributes in expression.

Periphrasis— a roundabout manner of expression using well-known attributes to give an indirect reference to something.

e.g. That hunter is no St. Francis.

4 Dramatism (irony of dialectic)

Irony— an expression intended to convey the opposite to the literal meaning.

e.g. Street whores have a lot of class.

Antithesis— a sharp contrast between juxtaposed concepts; a counter proposition.

e.g. The hotter the day became the cooler the shade seemed to the picnickers.

Double entendre— a concept with two interpretations, one more direct and obvious and the other less easily discernable and often indiscrete.

e.g. The lotion left every inch of her body alive with delight.

The tropes transform real events into imaginary substitutions; they are a means for enlivening expression. But in order for them to be comprehensible they must operate within the potential range of understanding in the audience. In visual terms this may be demonstrated by showing a clean face instead of a bar of soap – that is, using a rhetorical figure. The face is used symbolically (extrinsic source of meaning). This departure from “straightforward representation” is employed for the sole purpose of enlivening the expression by presenting the unexpected. It’s metonymic form is correct insofar as it attracts attention (*puratis*). In this regard it may be said to be appropriate form (*aptum*). Momentary cognitive dissonance is created in the perceiver and a state of “tension” exists. And the greater the deviation the greater the dissonant tension and the livelier the expression. The expression, although in a state of tension, is comprehensible (*perspicuitas*). Up to a point. If an individual’s threshold of resolution is crossed the image has a negative effect, as in the earlier example of the student. Language is not comprehensible if the metaphoric extension is not appreciated and the signs of expression are indistinguishable from the things referred to.

However in communicating through graphic representation either direct reference or substituted reference can be made. The bar of soap could equally have been shown (+intrinsic source of meaning), either alone or together with the clean face, as deemed effective. More than one perspective could be given. Whether direct representation, figurative representation, or a combination is used depends on the binding context and the number and kind of relationships that exist in it – that is, on its cultural and social accretions.

A dialectic of the ordinary and the unexpected exists in every communication situation and is drawn into the expression through the process of analysis (definition/discovering options). Eshes says,

Whereas the obvious tends toward satisfying expectations by responding to existing standards, the new moves toward upsetting those standards by way of a novel and atypical approach with lesser relation to existing expectations. This situation may be described as a state of mutual equilibrium between both

preservative and changeable forces. In responding to existing expectations and supplying something unexpected at the same time, a design produces a challenge (a pleasant or unpleasant surprise) in addition to a renewed and extended perspective.¹⁰⁴ ● Hanno H. J. Eshses. "Representing Macbeth: A Case Study in Visual Rhetoric," *Design Issues*, Spring 1984.

There is a tension between the appropriateness and comprehensibility mediated (and ameliorated) by the attractability of the visual forms. Hence the communicator is obliged to always search for new forms for perennial messages.

While I have from the outset been making a direct connection between all acts of language, visualization has some of its own unique characteristics because of its $\pm$ intrinsic/extrinsic characteristics. Unlike the laws of diction outlined earlier, visual form cannot be so categorized.¹⁰⁵ ● Compare, for example, Donis A. Dondis. *A Primer of Visual Literacy*; MIT Press, Cambridge, 1973; with Wucius Wong. *Principles of Two-Dimensional Design*. Van Nostrand Reinhold, New York, 1972.

All that can be provided in the way of laws is that visual marks may undergo changes as follows:

- 1 They may be added to.
- 2 A portion may be deleted.
- 3 They may undergo permutation.
- 4 One part of a complex form may be substituted by some other.

These four basic visual operations, however, are in relation to the five kinds of form: logical progression in form, qualitative progression in form, repetitive form, conventional form, and incidental form. On this basis visual transformation can proceed. Within the bounds of existing conventions (conventional form) acceptable innovations can be created by transforming the terms and "images" in the index of "linguistic facts" generated in the analysis into graphic form. It is a process I call *synthetic analysis* because its objective is to synthesize from the body of analytical "linguistic facts." It can be outlined as follows:

- 1 Logical progression in form
 - a) Experiment in organizing key-words and phrases (incidental form) into logical sequences and groupings (schematic experimentation).

- b) Experiment with divisions in the whole unit of expression (1) of single pages or (2) multiple numbers of pages of either folds and/or positioning points.
 - c) Experiment with hierarchies of word-concepts and picture-concepts (incidental form) in the most logical way possible, in as objective a typeface (+extrinsic characteristics) as possible, within logical grids (further schematic experimentation).
- 2 Qualitative progression in form
- a) Replace objective type with type having more "picture-ness."
 - b) Make freely expressive compositions (several variations) that interpret the word-concepts and picture-concepts in some way that is dynamic, and renders the schemes less logical.
 - c) Make a visual analysis of the previous step (allowing in some logic) according to:
 - (1) eye movement
 - (2) concentration of density and textures
 - (3) hierarchies
 - (4) repetitive form
 - d) Synthesize elements from previous steps into another composition utilizing colour if applicable.

In following this sequence of operations an innovative expression results. Both the depiction of specific content and larger structures of the entire unit of expression are combined into a single creative act. (As in figure 24.) It's attractiveness lies in a kind of "dynamic form," neither entirely rational nor non-rational, resolving the coding variables, and originating within the communication situation and meeting its needs, while having the tension of appropriateness and comprehensibility. There is a balance struck between opaque and transparent form.

The process of synthetic analysis yields visual innovations applicable to simple acts of communication involving a single message as well as complex ones involving many messages over a period of time as might be found in institutional or corporate visibility.

Realization. Where "technique" requires many independent operations for the completion of any given making process (because

of its inherent division of labour), new technology reduces these divisions and integrates them into the creative process, now in the hands of one individual. Where there were once distinctly different operations in the preparation of images for reproduction – typesetting, pasteup, drawing, cutting overlays, stripping film, etc. – these distinctions are being eroded as one person carries out a number of the various preparatory steps more or less simultaneously in one device.

5 Concluding Remarks

5.1 Summation

In the preceding sections an attempt has been made to develop an approach to graphic communication with a sufficiently broad philosophy to deal with the ambiguities of the phenomenon of concepts. It has been conducted within the context of new technology generally and the personal computer in particular.

Where the age of "technique" has been characterized by a greater and greater division of labour and the specialization of skills to the degree that the literate individual is dependent on a host of technical specialists to publish his documents. This is changing. Digital technology is making greater demands on the communication skills of the ordinary individual because the personal computer contains the means for achieving many of the special operations hitherto completed by the specialists. Furthermore, the age of "technique" has provided the notion that language is a set of precise relationships. The rationalism characteristic of the age has resulted in great emphasis being placed on the individual's skill of writing, especially didactic or prosaic writing, to the detriment of poetic writing and the pictorial representation of concepts. Art is one of the specialisms. Letterpress and its ancillary print technology encourages this trend. But new technology integrates words and pictures, making it incumbent on the ordinary literate individual to take advantage of their combined effect in communication.

The means for achieving an holistic approach to the phenomenon of concepts is rhetoric. Rhetoric is the locus of consciousness in that it "strives that what is desirable shall appear desirable, what is vicious shall appear vicious." It deals with the ordinary things that people dispute over. Rhetoric has to do with the appearance of concepts so that others can apprehend and comprehend them. This appearance can equally be word-form or picture-form. It is the physicality of concepts. And the apprehension and the comprehension of concepts is possible only by the inter-dependence of the physicality that lies external to us and the internal mechanism of concept processing. This inter-dependence is deeply imbedded in the nature of language and consciousness lending the ambiguity we experience in communication. Efficacious communication depends on an appeal made to the perceiver's whole personality: *logos*,

pathos and *ethos*. Hence the process of concept processing is a dynamic interaction between a person's memory store, direct experience, and the experience of signs. They are therefore always contingent on the mental process required in their interpretation. They are rooted in culture. Communication depends on both rational and non-rational factors found in consciousness. The three components of concept processing are variously dissonant and meaning ultimately depends on the resolution of the dissonance. The apprehension of signs results in one or all of four levels of meaning for the perceiver.

Finally rhetoric provides a means for inventing the unit of expression with its variety of conceptual associations. From its perspective ambiguity is the means for achieving richness in the word-concepts and picture-concepts of communication. Concepts are the cognitive aspect of signs which depend on the mode of their physicality and the technique to give them form. Therefore there is a relationship between what to select to represent a thing or an idea, how to depict the representation and with what to achieve it. The physicality of signs contains different sources of meaning. Signs either variously imitate the thing they represent ($\pm$ iconicity) or they do not at all. Hence meaning can emerge from either intrinsic sign characteristics or extrinsic ones, and word-signs and picture-signs are not unrelated but exist along a continuum of form. This inter-relationship of intrinsic and extrinsic sign characteristics is the means to achieve the conceptual associations in the unit of expression. It consists of both "picture-ness" and "word-ness" which the perceiver experiences as being either transparent or opaque form.

The process of invention afforded by rhetoric is aimed at limiting conceptual associations according to specific goals of persuasive communication. Because the functions of word-making and picture-making are integrated by various software programs in the operation of the personal computer, it is a tool ideally suited to rhetoric in the creative process.

5.2 Ambiguity

The network of implication within each individual is carrying on a "credibility check" on all sign perception. Given the fact that signs have both a denotative and a connotative aspect, the implications of each sign in a system of signs or in the combinations of sign systems are inherently complex and the network of implication is affected by the ways in which signs interact within the unit of expression. It must be reiterated that ambiguity refers to all kinds of secondary conceptual associations encountered in the multi-faceted nature of the phenomenon of concepts, and language is characterized by a "metaphor process" in which one thing stands for another. Within the unit of expression one concept is modified by the implications of other concepts presented in its entire makeup. In other words, the comprehension of concepts depends upon their contexts. This is immediately twofold. It is the unit of expression and it is the system of knowledge and belief that an individual brings to it.

The scientific approach to language is concerned with the extreme limitation of conceptual associations of signs. By their context signs must indicate that they represent one and only one object. Science qua science views ambiguity as being fatal. To the scientist the wealth of meaning brought about by individual perceivers' systems of knowledge and belief is the object of suppression. It is a nuisance. In contrast, while speaking specifically of poetry, but applicably to communication generally, Winnifred Nowottny says, "The existence of an ambiguity depends on a relation between some particularity in a context and something in the state of the language at large which makes it possible for a particular word or group of words to enter the particular context without reducing the context's complexity by its entry." • Winnifred Nowottny. *The Language Poets Use*. Athlone Press, London, 1962, p. 151. To the rhetor ambiguity is a source for achieving breadth and depth in expression. It is precisely the relation between language at large – myth – and the particular context (the unit of expression) that interest him most in addressing the rational and non-rational personality attributes of the audience. It is the range of conceptual associations in word-signs and picture-signs and allowed by the unit of expression that concerns him in the application of technique in the form-giving process.

Gombrich has pointed out that we remain mostly unaware of the degree to which the meanings we ascribe to signs is done by our

"application of situational clues to 'make sense' of what is being said. . . . not by any conscious process of inference but through that faculty which was given us for understanding our fellow creatures, the faculty of empathy or identification. We first grope for the intention behind the communication, and the key to this intention lies largely in the way we would react." • E. H. Gombrich. *Art and Illusion*. Princeton University Press, Princeton, 1969, p. 232.

In pursuing efficacious communication a communicator desires a reaction from the audience and it is the ambiguity he creates that elicits it. It is in using both the schemes and the tropes of language. It is through the logical progression, qualitative progression, repetitive form, conventional form, and incidental form of the unit of expression that it is achieved.

To create visual form means that various pairs of attributes must be considered and positive ones discovered: attractive/unattractive, eye-catching/insignificant, interesting/boring, usual/unusual, simple/complex, inviting/uninviting, active/passive, strong/weak, bright/dull, legible/illegible, readable/unreadable, good/bad, up-to-date/old fashioned, etc. The manipulation of form is an easy task using the personal computer. Therefore page composition can be ambiguous and dynamic, utilizing juxtaposed typographic, pictorial, and graphic elements to make visually exciting form resulting in documents having positive formal attributes.

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